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Advertising a Factory to the Employee

How Folders Are Used in Pay Envelopes of the Cleveland Hardware Company to Emphasize Attractiveness of Working Conditions

BY F. L. PRENTISS

Believing that the press agent is fully as important for the manufacturing plant as for a place of amusement, a system of publicity, the function of which is not to advertise its products to the trade but to advertise the plant itself to its employees and prospective employees, was placed in operation a few months ago by the Cleveland Hardware Company in connection with its welfare department. This publicity is obtained through the form of attractive illustrated pay-roll folders containing inpresent time when the demand for labor exceeds the supply and good workmen are particularly scarce. Under these conditions the best managed plant cannot hope to keep all of its good men, but strives to reduce to as low a percentage as possible the number of efficient employees who quit because of offers of higher wages elsewhere or for other reasons, and to add to its ranks other good work-

While the pay-roll folders do not go directly to

The Information That Two Different Folders Conveyed to Employees

This advertises the company's mutual benefit insurance association:

When you take a job, you should consider the things offered which are something more than wages.

Among the many things this company has to offer is membership in the Employees' Benefit Association

One of the best and safest insurance societies in the country.

Workers here get for 25 cents what would cost them one dollar from a regular insurance company.

Nearly Fifty Thousand Dollars paid to members in the last fifteen years.

A careful man will think twice before losing

membership in this society.

This was added to the announcement of the sale of 20,000 bottles of milk by the company's stores in one month:

Be careful what you drink during the hot weather.

While hot weather is uncomfortable, it is not unhealthy. This is proved by the fact that we practically never have cases of heat prostration, and in nine cases out of ten, when workers are affected it is on account of something wrong with the stomach.

A bottle of good milk is cheaper and much more healthful than a whole pail of beer.

Take good care of your body and it will take care of you.

teresting information about various features of the plant. The folders are designed to improve the welfare and working conditions of the men, and contain health hints, safety advice, talks on the evil effects of liquor and other matters of interest to employees.

The theory back of the publicity scheme is briefly as follows: The company in the operation of its plant requires a certain number of workmen and has created a certain number of jobs. If it were operating a retail store it would advertise its wares and they would be purchased by people desiring them. Instead of advertising its goods for sale at retail, as it would do were it a merchandising company, it has places to be filled, and it follows the publicity method to present its wares in their most attractive form to the workmen, the wares in this case being positions instead of merchandise. This form of publicity is of particular interest at the the men not in the company's employ, they are designed to bring before the employees things about the plant that the company thinks the men should know, so that the men will feel it is a good place to work in and they will be less inclined to leave. The company believes that if the men instead of going no deeper into the subject than to know that they are earning so much a day at such a plant come to think that the plant is a very good one to work in and a better one than almost anywhere else because of working conditions and shop convenience, not only will they be more content and less likely to leave to work elsewhere, but they will advertise the fact among their outside acquaintances that the plant is a first-class one. the latter will seek employment in the plant where working conditions are good. An advantage of this form of shop publicity is apparent from the fact that conditions may be equally good in another shop that does not advertise itself to its men in this way, but the men in the other shop may not appreciate what is being done for them because it is not brought to their attention in printed form.

A folder entitled "An Eight-Hour Day" reads as follows:

The workers of The Cleveland Hardware Company have the benefit of the eight-hour day. The question is—

Is it a benefit?

The ideal is, eight hours each of WORK, RECREATION and HEALTHFUL SLEEP.

 Do your hours of recreation bring you money returns? Recreation may be a benefit or a detriment according to its application.

Some of our workers recreate by gardening, farming, keeping stores, and other things which bring in money.

What about you?

A pay-roll folder is placed in each of the pay envelopes every week. The folders are neatly printed on thick paper and on the cover page is a few words in large type indicating the contents. One inner page usually has an illustration of some part of the plant of special interest to the men, such as the hospital, roof garden or an illustration showing the right way to do something in order to avoid accidents. On the opposite page there is timely advice to workmen in simple language about the care of the body, the avoidance of accidents and on various other pertinent topics. On the back cover page is the following, printed in nine languages besides English:

"Take this home and have some one read it for

you if you cannot read it yourself."

That the folders are taken home and read is indicated by the fact that very few of them are

One folder bearing the caption "It's Hot and We Have Hot Jobs" was got out in the hot summer months and reads as follows:

A good sweat does more to get the poison out of our systems than anything else. Lots of rich men pay a dollar and more to take a Turkish bath, and it is nothing more than taking a good sweat.

This is the most healthy time to work in the forge shop. It opens the pores, lets out the poisons, and there is no cold draft which brings bad results.

A good sweat, lots of exercise, then a bath and good rest, is the best medicine. When you take medicine, take it regularly.

Eight hours work at the C. H. Co. every day, then a good swim in Lake Erie and a few hours' rest in the parks. Spend some money for a tent to sleep out in your yard, and you will never need a doctor.

thrown away in the shop. While a good many employees have left its employ to take other jobs since the plan has been in operation, the company feels that results have so far been satisfactory, and especially in view of the fact that its force of employees has been increased from about 1500 to 3000 since the plan was inaugurated.

While the company's publicity through its folders is designed to raise the standard of its employees by securing and keeping the best quality of labor and teaching the men right living so that their efficiency will not be impaired, it is not expected that this plan will directly speed up production by arousing the men to do their best. Most of the men

are employed on piece work, and in the opinion of the company the increase in earnings offered as a reward for increased output under the piece-work system is not sufficient an incentive to spur a man to his maximum efforts. Other means are resorted to to get this increased production. The one of these that is regarded as the most efficient is the one that appeals to the man's sporting instinct to excel his fellows. Putting this theory in practical operation, various units either small or large are often pitted against each other. It may be one machine against another machine, a night turn against a day turn, one department against another department or the company's No. 1 plant against its No. 2 plant. Again information may come in that a

One folder that relates to the nurse reads as follows:

The workman cannot earn good wages unless he has a strong, healthy body.

The workman cannot earn good wages unless his home conditions are good—unless his mind is at rest concerning those whom he loves.

The Cleveland Hardware Company wants its workmen to earn the highest wages possible. There is nothing gained by having workmen who cannot earn good money.

The Cleveland Hardware Company has employed a trained nurse, who will give advice and attention, not only to the employees, but to their families, if they will but let us know their need.

Consult the nurse, if only for the slightest ailment.

competitor turned out a certain amount of forgings in a stated period, and both plants of the company will join hands in an effort to make a larger production record than their competitor.

Iron Ore Deposits of Firmeza District

The iron ore deposits of the Firmeza district, Cuba, are described in a paper to be presented at a meeting of the American Institute of Mining Engineers in February, 1917, by Max Roesler, Santiago de Cuba, from which the following information is abstracted:

The ore bodies of the district form a belt of deposits extending from Sigua, 25 miles east of Santiago, to Sevilla, 5 miles east of the same city. They lie on the eastward slope of the Sierra Maestra Mountains and the elevation of the mines is from 400 to 1000 ft. above sea level. Immediately east of the Firmeza district is the Daiquiri district of the Spanish-American Iron Company.

ican Iron Company.

The ore in the Firmeza district is a mixture, in varying proportions, of magnetite and hematite. It is remarkably pure and contains little foreign matter. The following analysis is given:

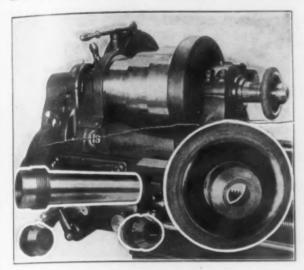
Moisture (in part hygroscopic) 0.24 - 0.81
Silica and insoluble 5.00 -10.50
Phosphorus 0.009- 0.0065
Sulphur 0.045- 0.248
Iron 61.00 -68.50

The low phosphorus and the absence of appreciable amounts of titanium, Mr. Roesler emphasizes, make the ore valuable for the manufacture of high-grade steel.

In shape the deposits are extremely irregular. All bodies have the common feature of a much greater extension in two dimensions than in the third dimension. They resemble a series of scattered lenses of irregular outline, that lie in every conceivable position. The size of the deposits ranges from pockets containing a few tons to lenses whose larger diameters are some hundreds of feet long and which are from 10 to 50 ft.

Draw-in Collet Chuck for Engine Lathes

As a substitute for the customary draw-in collet chuck made for engine lathes, the Globe Engineering Company, Cincinnati, Ohio, has placed an improved type on the market. This chuck is designed to take the place



A New Draw-In Collet Chuck for Engine Lathes Which Is Opened and Closed by a Knurled Handwheel

of the spindle center and in addition is tightened or released at the nose of the spindle. In this way the operator does not have to leave his regular position and go to the rear of the lathe, which fact, of course, effects a saving in time. A knurled handwheel is the means employed for opening and closing the chuck.

The chuck body and the nose piece are made of heattreated steel finished by hardening and grinding. The chuck has a No. 3 Morse taper center for small lathes and on tools where the swing ranges from 16 to 20 in. a No. 4 taper is furnished. Oil tempered tool steel is used for the collet, which is split back for about threequarters of the distance from both ends. A grip on the stock extending the full length of the collet is secured when it is tightened by the handwheel.

when it is tightened by the handwheel.

The following table gives the principal dimensions and specifications of the chuck, which is made in two

Number of chuck	0	1
Morse taper of shank	No. 3	No. 4
Capacity in round stock, in	56	%
Capacity in hexagon stock, in	36	56
Capacity in square stock, in	7/16	9/16
Diameter of handwheel, in	5	6
Projects beyond lathe spindle, in	2 34	21/2

To attach the chuck to the lathe the spindle center is removed and the taper end of the chuck pushed into place. The nose piece on which the handwheel is mounted is next removed, and the collet inserted in the opening in the chuck body. After this the nose piece is screwed back in place and the chuck is ready for use.

Swedish Electric Furnace Pig Iron

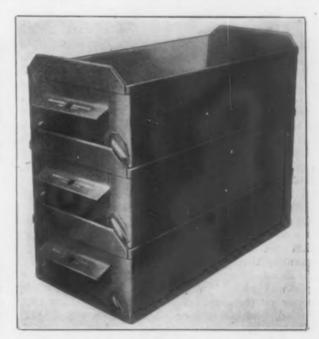
Considerably over 100,000 tons of iron is produced annually in Swedish electric reduction furnaces, J. O. Boving states in the London Iron and Coal Trades Review. The process has now been developed so that molten pig is delivered direct to the open-hearth furnaces which are heated by gases from the reduction furnaces. The liquid charge from the open-hearth furnaces is transferred to an electric refining furnace. The final steel is reported to be of remarkably high quality. Mr. Boving says this is plainly the right method where electric current can be obtained at a reasonable price.

Robert W. Hunt & Co., Chicago, announce that the November issue of their *Employees' Bulletin* will be devoted to rail inspection and will contain several articles of general interest along that line. Those desiring copies may obtain them upon request.

A New Tote Box of the Stacking Type

An improved tote box designed for stacking has been placed on the market by the New Britain Machine Company, New Britain, Conn. As compared with the earlier box of the same company, which was illustrated in The Iron Age, April 13, 1916, the sides and ends of the box only slope out slightly. This is designed to support the box above without permitting the latter to interfere with the contents of the lower box. In the earlier box the ends and sides were bent out at a considerable angle, so that the boxes would nest quite closely. Other changes in design include the use of half-round runners on the bottom of the box and lugs on the ends, which assist in stacking and also help the runners to counteract any tendency of the sides to spring in under heavy weights.

The box, which measures 20 in. in length, 12 in. in width and 6 in. in depth, is made of No. 16 gage steel and is electrically welded. The handles are made of No. 14 gage stock folded double and punched to afford a hold for the hook when the box is dragged along the floor. This size of box, it is pointed out, was decided upon as meeting the average requirements of industrial establishments without holding more than one man could handle comfortably. The stiffness of the box is further increased by a %-in. selvage around the edge. The ends extend 1 in. above the sides and are folded over on the edge of the sides where the latter lap. These raised ends are bent out slightly to permit the box above to slip into place. This raised end, it is pointed out, gives space above the handle for a card holder in which the card is not so likely to become soiled. The upper corners of the ends are cut off at an angle of 45 deg. and embossed pieces are spot welded to the lower corners



In this Improved Form of Stacking Tote Box the Ends and Sides Slope Outward Sufficiently to Support the Box Above without Reducing the Capacity for Rectangular Pieces

of the ends at the same angle. These are relied upon to act as guides in bringing the box to the stacking position and in conjunction with the runners on the bottom serve to prevent any side shifting of the boxes while they are being trucked.

The National Association of Sheet Metal Products Manufacturers, at its annual meeting at the Hotel La Salle, Chicago, Oct. 17-18, discussed at length the restrictions placed by the mills on the sale of sheets both as to deliveries and terms and also continued the efforts of the association in support of the use of full weight sheets. For the ensuing year the following officers were elected: President, C. C. Crouch, Butler Mfg. Company, Minneapolis; treasurer, C. A. Kramer, Columbia Steel Tank Company, Kansas City, Mo.; secretary, H. B. Kelly, Waterloo, Iowa.

Gases Occluded in Alloy Steels*

Effect of Nickel, Silicon, Chromium and Manganese on the Nature and Volume of the Gases—A Summary of Previous Work

- BY J. W. DONALDSON -

Since Graham in 1865 heated wrought iron in vacuo and found the evolved gases to be a mixture of CO, CO, H, and N, many investigations have been carried out on gases occluded in pig irons and steels. Steels have been dealt with, varying both in carbon content and in method of manufacture. So far, no investigations have been

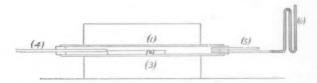


Fig. 1—Diagram of Apparatus Used to Determine Gases in Alloy Steels. (1) Porcelain Tube. (2) Boat. (3) Furnace. (4) Silica Tube for Thermocouple. (5) To Three-fall Sprengel Pump. (6) McLeod Gauge

carried out on the alloy steels, and the object of the present research is to deal with those types of steel.

SUMMARY OF PREVIOUS WORK

Before describing the method of carrying out the research and considering the results obtained, a short summary of the work previously done and of the results obtained with ordinary carbon steels is offered. Parry, whose experiments followed those of Graham, worked on a number of commercial irons and steels. He found that the principal gases evolved were carbon monoxide and hydrogen, the hydrogen predominating at low temperatures. The volumes of the evolved gases being high, however, have always caused his results to be adversely criticized.

The researches of Troost and Hautefeuille, published in 1876, followed and confirmed the nature of the dissolved gases, viz. that hydrogen was dissolved in excess of carbon monoxide. They also indicated that cast iron dissolves gases in considerably larger quantity than does steel.

Stead found that a considerable quantity of gas was evolved when a steel was drilled under water or mercury. The volumes of gas obtained varied, and the nature of the gases was slightly different from those obtained by heating steel in vacuo. Müller's work, on the other hand, confirmed that of previous investigations as to the nature of the evolved gases.

Boudouard's researches were conducted on merchant iron and iron wire, while Belloc, dealt with a mild steel (0.12 per cent carbon) in order to ascertain the relationship between the temperature and the rate of evolution of the gas. The rate of evolution was found to agree with the critical points of the steel. The nature of the evolved gases was in accordance with previous results.

The effect of deoxidizers on the dissolved gases was the object of investigations carried out by Goerens, samples of steel taken before and after deoxidation being heated in vacuo and the evolved gas being collected and examined. The results ob-

tained indicated that certain processes of deoxidizing steel increased the volume of dissolved gas.

From 1908 to 1910 Baker carried out researches on gases occluded in mild and high carbon steels, He found that the nature of the evolved gases was similar in each of those steels, the carbon content having apparently no effect on the dissolved gases. The maximum evolution of gas occurred at the critical points; reheating the steel had no appreciable effect on the volume of gas evolved, but mechanical operations such as rolling reduced the volume of gas retained by the steels. The evolved gases were chiefly carbon monoxide and hydrogen, carbon dioxide and nitrogen only occurring in small quantities, and constituting not more than 2.5 per cent of the total gas evolved. Methane was also present in extremely small quantities. Hydrogen was in excess at low temperatures, but diminished in quantity as the temperature rose. The carbon monoxide attained a maximum at 700 deg. C. Above 760 deg. C. carbon monoxide and hydrogen occurred in equal proportions.

The most recent researches on the subject of occluded gases have been the work of Charpy and Bonnerot and of Austin. Charpy and Bonnerot's investigations dealt with the effect of pressure, the quantity of the steel used, and the form (solid or drillings) of the steel, on the volume of the dissolved gases. A number of commercial steels were also examined. Austin heated cast iron and various commercial steels to their melting points in vacuo and collected all the gases evolved from the metal.

In all the above investigations, although many of the results obtained have been at variance and

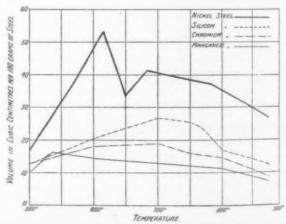


Fig. 2—Chart Showing Amount of Gas Obtained from Nickel, Silicon, Chromium and Manganese Steels

definite conclusions have been difficult to arrive at, one or two points may be taken as more or less generally accepted. These may be summarized as follows:

Wrought iron, cast iron, and steel dissolve gases in varying quantities, those gases being CO, CO₃, $H_{\rm b}$ N₃, and CH₄.

In steel the principal dissolved gases are CO and H_b Hydrogen predominates at low temperature, diminishes to a minimum as the temperature increases, but slightly

^{*}From a paper which was granted a Carnegie Scholarship memoir by the Iron and Steel Institute in May, 1916.

still further heating. CO is at a minimum increas eratures, increases to a maximum, and then creases. Both gases are present in more or slightly proportions at high temperatures. CO2, CH4, y occur in small quantities, and do not as a on dissolves more gas than steel. rule ex

ag steel under water or mercury liberates a le amount of gas.

Reheating a steel does not affect the volume or nature of the dissolved gas.

Mechanical work such as rolling or forging decreases

the volume of dissolved gas.

The rate of evolution of a gas from a steel has a relation with its critical points, the largest amount being evolved at the critical points.

The chief points investigated in this research were:

The nature and volume of the gases evolved when the steels are heated in vacuo.

The relationship, if any, which exists between the percentage of the special element present and the na-ture and evolution of the gas.

The relationship, if any, which exists between the critical points and the nature and evolution of the gas.

The alloy steels dealt with in the present report are nickel, silicon, chromium, and manganese steels.

APPARATUS USED

The steels, in the form of coarse drillings contained in a porcelain boat, were introduced into a porcelain tube glazed internally and externally. One

Table 1-Results on Nickel Steel (25 grammes)

Remarks	Ng per Cent	CH4 per Cent	H ₃ per Cent	CO per Cent	CO, per Cent	Volume of Gas in C.C. (at N.T.P.)	Temperature of Heating, Dog. C
slow evolution of gas. Ex-	0.47	0.23	95.79	2.22	1.29	4.2	500
volution of gas. Exhaust- n 5 hr.	0.13	0.39	61.17	37.66	0.65	9.3	570
evolution of gas. Ex-	0.18	0.33	48.16	50.33	1.00	13.3	6161
volution of gas. Exhaust- n 5 hr.	0.12	0 22	24.52	74.57	0.57	8.4	652#
evolution of gas. Ex-	0.25	0.36	38.19	60.72	0.48	10.3	6841
evolution of gas. Ex-	0.31	0.39	51.41	47.31	0.58	9.3	782
low evolution of gas. Ex- sted in 4 hr.	0.23	0.22	47.64	51.31	0.60	6.7	880
	0.24	0.31	52.41	46.30	0.74	com-	Average

Arl maximum. 2Ar3 maximum. 3Ar2 maximum.

end of the tube was connected to a 3-fall-Sprengel pump and a McLeod gage, while the other end entered a platinum-iridium thermocouple inclosed in a silica tube. The porcelain tube was heated by a gas-fired furnace. Fig. 1 shows a sketch of the

The composition of the steels investigated was as follows:

	Nickel.	Silicon, C	Chromium,	Manganese,
Carbon Silicon Manganese	0.084	Per Cent 0.21 3.46 0.29	Per Cent 0.43 0.32 0.25	Per Cent 0.08 0.13 3.50
Nickel Chromium	. 3.20	***	3 28	*** *

The above steels were obtained having, as nearly as possible, a similar percentage of the special element in order to ascertain what effect, if any, the various special elements had on the nature and evolution of the evolved gases. The carbon content varies. This should have a slight effect on the volume of the gases, but no appreciable effect on the nature of the gases. The nickel steel was rolled, the silicon, chromium, and manganese steels being forged. The samples heated were in the form of

coarse drillings, care being taken in the drilling to prevent contamination from oil and other sources.

METHOD OF WORKING

Before proceeding with the examination of the steels, the apparatus was thoroughly tested in order to make quite certain of the impermeability of the

Table 2-Results on Silicon Steel (40 grammes)

Temperature of Heating, Deg. C	Volume of Gas in C.C. (at N.T.P.)	CO, per Cent	CO per Ceat	H Cent	CH ₄ per Cent	N per Cent	Remarks
500	5.1	1.46	3.64	94.54	0.24	0.12	Very slow evolution of gas. Ex- hausted in 4 hr.
600	8.1	0.33	7.96	91.46	0.17	0.08	Slow evolution of gas. Ex- hausted in 5 hr.
700^{1}	10.7	0.26	41.16	58.21	0.26	0.11	Rapid evolution of gas, Ex- hausted in 6 hr.
750	10.2	0 59	53.13	45.79	0.29	0.20	Rapid evolution of gas. Ex- hausted in 6 hr.
7672	9.6	1.18	54.27	44.10	0.27	0.18	Slow evolution of gas. Ex- hausted in 5 hr.
800^{2}	6.8	1.39	53.87	44.16	0.35	0.23	Slow evolution of gas. Ex-
880	5.0	2.11	49.04	48.06	0.30	0.52	hausted in 5 hr. Very slow evolution of gas. Ex- hausted in 4 hr.
	compo-	1.05	37 59	60.90	0.27	0.19	

¹Critical range. ²Maximum point of range.

tube to furnace gases, and also to insure the complete removal of any occluded air or gas in the material of the tube. It was found that on heating to 900 deg. C. for seven hours per day, the amount of gas evolved was a constant quantity of 1 c.c. per week. A quantity was collected, and on examination was found to have the following composition:

CO ₂		0												0			0	0		Per Cent 14.21
CO																				9.76
H.										9										
CH																				
N.																				4 60.00
																				-
																				1000

This quantity was so small that it was thought unnecessary to make a correction for it in the analyses.

After the steel was introduced, the tube was exhausted and allowed to stand for 24 hours be-fore beginning to collect the gases. To remove the film of air still clinging to the tube it was necessary

Table 3-Results on Chromium Steel (40 grammes)

Temperature of Heating, Deg. C	Volume of Gas in C.C. (at N.T.P.)	CO ₂ per Cent	CO per Cent	H ₂ per Cent	OH, per Cent	N, per Cent	Remarks
500	5.1	2.11	18.21	78.84	0.32	0.52	Slow evolution of gas. Ex- hausted in 4 hr.
600	7.3	2.52	27,72	68.78	0.25	0.73	
7001	7.6	0.91	40.16	58.25	0.15	0.53	Rapid evolution of gas. Ex- hausted in 6 hr.
750	6.4	1.53	52.69	44.92	0.33	0.53	Slow evolution of gas. Ex- hausted in 5 hr.
775°	6.1	1.38	62.31	35 62	0.23	0,46	Slow evolution of gas. Ex- hausted in 5 hr.
8001	5.9	2.58	62.92	33.58	0.33	0.59	Slow evolution of gas. Ex- hausted in 4 hr.
880	3.6	2.41	49.96	46.89	0.33	0.41	Very slow evolution of gas. Ex- hausted in 4 hr.
	e compo-	1.92	44.85	52.41	0.28	0.54	

¹Critical range. ²Maximum point of range.

to heat it to 300 deg. C. The air was rapidly evolved and its composition shown by analysis.

As no appreciable amount of gas was evolved below 500 deg. C., this temperature was taken as the initial temperature of heating. Heating was also maintained at various temperatures covering the critical ranges of the steels. The final temperature of heating in each case was 880 deg. C. In

most cases the gas was completely evolved at each temperature in from five to six hours, but for uniformity a period of seven hours' heating was maintained. The rate of evolution of the gas was observed by the movement of the mercury in the McLeod gage.

CONSIDERATION OF THE RESULTS

In considering the results the first point to be noted is the volumes of the gas evolved from the various steels. Referring to Table 5 or Fig. 2, it is

Table 4-Results on Manganese Steel (40 grammes)

Temperature of Heating, Deg. C	Volume of Gas in C.C. (at N.T.P.)	CO. per Cent	CO per Cent	H, per Cent	CH4 per Cent	N _y per Cent	Remarks
500	4.6	2.66	10.13	86.31	0.53	0.37	Very slow evolution of gas. Ex- hausted in 4 hr.
5371	6.5	1.53	15.42	82.44	0.38	0.23	Slow evolution of gas. Ex-
600	5.8	2.33	32.17	65.00	0.25	0.25	Slow evolution of gas. Ex-
700	5.2	0.91	51.09	47.45	0.26	0.29	Slow evolution of gas. Ex-
800	4.5	1.99	65.63	31,60	0.33	0.45	Very slow evolution of gas. Ex- hausted in 4 hr.
880	3.0	2.21	48.15	48,89	0.37	0.38	Very slow evolution of gas. Ex- hausted in 3 hr.
	compo-	1.94	37.10	60.28	0.35	0.33	

'Critical range maximum.

seen that the largest amount of gas is obtained from the nickel steel, the volumes obtained from the silicon, chromium, and manganese steels diminishing in the order given. Compared with the results obtained in some previous investigations on This ordinary carbon steels, the volumes are high. may be due to the fact that the steels dealt with were not specially prepared steels, but ordinary commercial steels. The nickel steel is an acid openhearth steel, the others crucible or side blown converter steels. It would have been interesting and instructive to have compared the results obtained with those which would be obtained from carbon Time did steels prepared by similar processes. not permit this being carried out for the present report, but such material has already been obtained and its examination commenced.

The nature of the gases obtained from the various steels offers some interesting considerations. In general, carbon monoxide and hydrogen predominate in the evolved gases, carbon monoxide at high temperatures and hydrogen at low temperatures. This is in accordance with previous investigations; carbon dioxide, methane, and nitrogen, in all cases, being less than 2.5 per cent of the total gas.

The average composition of the gas evolved from the nickel and chromium steels is similar to those given by Baker for high and low carbon steels. His results for a mild steel containing 0.13 per cent carbon were 1.17 per cent CO,, 45.64 per cent CO, 52.12 per cent H, 0.72 per cent CH, 0.37 per cent N_s. In the silicon and manganese steels the amount of carbon monoxide is decreased by about 8 to 10 per cent and the hydrogen increased correspondingly. This would appear to indicate that silicon and manganese decrease the solubility of steel for carbon monoxide while increasing its solubility for hydrogen. The amount of nitrogen in the chromium steel, although not exceptionally high, is distinctly higher than in the other steels, and shows little variation at the different temperatures.

With regard to the evolution of the carbon monoxide and the hydrogen, each of the steels might be considered separately.

In the nickel steel, carbon monoxide is present in small quantity at 500 deg. C. At 570 deg. C., however, it has increased by 35 per cent, and continues to increase until it attains a maximum at 652 deg. C. It then decreases, reaching a minimum at 782 deg. C., and then again increases slightly. The variation of the hydrogen is the reverse of the carbon monoxide, the maximum points of the former being the minimum points of the latter and vice versa.

The evolution of the carbon monoxide from the sili-

The evolution of the carbon monoxide from the silicon steel is different. Although in slightly larger amount at 500 deg. C., it does not show a marked increase at 600 deg. C., 700 deg. C. being the temperature where the increase takes place. The maximum evolution is obtained at 767 deg. C., from which temperature it decreases to a minimum at 880 deg. C. The hydrogen occurs in the reverse manner.

The percentage of carbon monoxide in the chromium steel is much higher at 500 deg., and its increase is gradual, no sudden increases being apparent. In this it differs from the nickel and silicon steels. The carbon monoxide shows a maximum and the hydrogen a minimum at 800 deg. C.

The manganese steel behaves in a manner similar to the chromium steel, the carbon monoxide attaining its maximum and the hydrogen its minimum at 800 deg. C. The increase and decrease of the two gases respectively are regular.

Considering finally the rate of evolution of the gases in the nickel steel, the largest amounts are evolved in the neighborhood of the Ar, and Ar, points, and similarly in the manganese steel, the largest amount is evolved in the region of the maximum point of the critical range. The silicon and chromium steels yield the largest volumes of gas at

Table 5—Cubic Centimeters per 100 Grammes of the Different Alloy Steels

Nieke	el Steel	Silicon	n Steel	Chromi	um Steel	Manganese Steel		
0.21 per Cent Carbon, Deg. C	3.20 per Cent Nickel, Cubic Cms.	0.21 per Cent Carbon, Deg. C	3.46 per Cent Silicon, Cubic Cms.	0.43 per Cent Carbon, Deg. C	3.28 per Cent Chromium, Cubic Cms.	0.08 per Cent Carbon, Deg. C	5.50 per Cent Manganese, Cubic Cast.	
500 570 616 652 684 782 880	16.8 37.2 53.2 33.6 41.2 37.2 26.8	500 600 700 750 767 800 880	12.7 20.3 26.7 25.5 24.0 17.0 12.5	500 600 700 750 775 800 880	12.7 18.3 19.0 16.0 15.2 14.8 9.0	500 537 600 700 800 880	11,5 16.3 14.5 13.0 11.2 7.5	
Total.	246.0	Total	. 138.7	Total	. 105.0	Total	. 73.9	
	c. c.		c.c.		c. c.		c.c.	

temperatures covering the whole of the critical ranges.

GENERAL CONCLUSIONS

The general conclusions which may be drawn from the above are:

The volume of the gas dissolved in alloy steels diminishes, according as the special element is nickel, silicon, chromium, or manganese.

The nature of the occluded gases is similar to those of ordinary steel, except that silicon and manganese decrease the amount of carbon dioxide present while increasing the amount of hydrogen. Chromium tends slightly to increase the amount of nitrogen. The evolution of the carbon monoxide and hydrogen varies for the different alloy steels.

The largest quantities of gas are evolved in the neighborhood of the critical points or over the critical ranges, agreeing with ordinary carbon steels in this respect.

The investigations were carried out by the author in the metallurgical laboratories of the Royal Technical College, Glasgow.

Cowan Transveyor Now Has Its Own Factory

The growth into an important business from the development of a device primarily intended for use only in the factory of its origin is shown in the case of the Cowan Truck Company, Holyoke, Mass. In 1910, only six years ago, H. W. Cowan, who was then superintendent of the White & Wyckoff Mfg. Company, also of Holyoke, manufacturing writing paper, devised a method of placing piles of paper on portable platforms having an arrangement to elevate them slightly from the floor so that they could readily be moved from one location to another. The idea was worked out in the location to another. machinery department of the company and resulted in what is called the Cowan transveyor. This machine, designed for the sole purpose of economizing in the handling of stock in the paper manufacturing plant, rapidly found its way into other establishments. The machines were for a time made in outside machine

The Cowan Truck Company was then formed and a part of the plant of the White & Wyckoff Mfg. Com-pany was used for truck production. The business has pany was used for truck production. since then so expanded that early this month the company moved into a new building in Holyoke erected for the sole purpose of manufacturing the Cowan transveyor. This building is 100 x 200 ft., three stories, and is built of brick and concrete with foundations sufficiently substantial to allow the erection of two more stories when required. The building is of mill type construction, equipped for the manufacture of ma-

Upon the organization of the Cowan Truck Company, the officers elected were: H. W. Cowan, president; J. L. Wyckoff, vice-president; E. N. White, treas-They still occupy these positions. Other officers are R. F. Lyon, general manager, and G. F. Jenks, assistant treasurer. Credit for many of the improvements in the Cowan transveyor is given to D. E. Hennessy, head of the engineering department. John Mc-George, consulting engineer, formerly of Cleveland, is associated with Mr. Hennessy in the engineering de-

partment. Romance tinges the entire situation, says the Holyoke Telegram, when mention is made of the various uses to which the transveyor is now put. The old Liberty Bell, which was so carefully conveyed across the continent from Philadelphia, was handled on a Cowan transveyor. A fireproof vault was especially constructed in San Francisco for the bell and twice daily it was moved out and in on a transveyor. munition plants thus handle shrapnel cases now being made all over this country. R. F. Lyon, who has just returned from an extensive tour of France and England in the interest of the Cowan Truck Company, reports that over 2000 Cowan transveyors are in use in those countries, mostly in the handling of shells. Bakers, chewing gum manufacturers, brewers, confectioners, textile manufacturers, leather companies, lumber companies and warehouses are also making general use of them. Different types of machines are naturally required for these various industries.

Application of this idea to power machines was the next step and the company is about to place upon the market its own electric transveyor equipped to handle platforms by raising the loads from the floor by motor and lowering them in the same fashion, the same power moving them from place to place. The Cowan transveyor, equipped with a storage battery, was illustrated

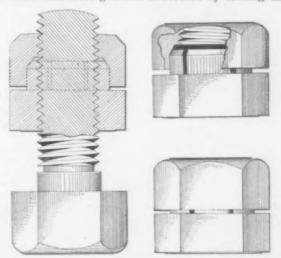
in THE IRON AGE of Oct. 15, 1914.

Wisconsin industrial accidents thus far this year show an increase of 64 per cent over the same period of 1915, according to figures issued by the Industrial Commission of Wisconsin. The increase is so great that the commission has found it necessary to engage a fourth examiner of cases. The fact that all factories and workshops are overcrowded with business is doubt-less responsible for the large increase in accidents. Claims filed in the month of August since the commission was created are as follows: 1912, 258; 1913, 557; 1914, 942; 1915, 1050; 1916, 1717.

A New Lock Nut Without Washers

A lock nut in which the dead and not the moving member is locked has been developed by the Western Screw & Lock Nut Company, 342 Mills Building, San Francisco, Cal. With this nut no washers are required and the nut can be locked at any point on the bolt, an arrangement which makes it possible to take care of oscillating or pulsating movements. The bolt and nut can be used over and over several times, it is explained, without damaging the threads. It is possible also to fit a United States standard nut tightly on a bolt having a V-thread, and it is also possible to make a nut tight on a loose fit bolt.

The lock nut consists of two members. The lower one, which is the nut proper, is similar in form to a regular hexagon nut and has four flexible finger members projecting from its upper surface. When the upper or locking member is screwed down, these fingers are compressed and the nut is frozen, as it is expressed, to The locking action is secured by turning the



In This New Lock Nut the Flexible Fingers of th Lower Member Are Compressed and Forced Agains the Thread of the Bolt as the Upper Locking Mem ber Is Screwed Down

locking member firmly. When locked in place this member is counted on to help carry the load. One of the features of the lower member is a number of threads which provide capacity to carry the load. The nut is released with an ordinary wrench, and when the locking member is released it will of course move as one of the ordinary type.

A recent test of the holding power of one of these nuts was made by bolting two pieces of % x 1½-in. bar steel together with a %-in. lock nut and one of the ordinary type placed 6 in. apart. The steel bars were suspended on heavy springs and an air hammer delivered 500 blows per minute with a force of 25 lb. midway between the two bolts. It is stated that the ordinary nut was jarred off in a short time, thus leaving the strain on the other bolt. After 9 hr. of continuous jarring at this rate the lock nut was still gripping firmly.

British Imports of Steel Ingots

Great Britain is importing large tonnages of steel ingots and always has, though the present rate is not as large as that before the war. In August last these imports were 12,178 gross tons against 14,987 tons in August, 1915. To Sept. 1, 1916, they were 104,224 tons, as compared with 123,547 tons to Sept. 1, 1915. The imports in the full year 1913 were 216,708 tons or 18,059 tons per month; in 1915 they were 199,180 tons. or 16,598 tons per month.

Imports of billets, blooms and slabs were 427,996 gross tons in 1915 against 513,988 tons in 1913, large shipments from Germany figuring in the latter total.

Purchasers of the Trigg furnace property, near Cadiz, Ky., recently noted, were a group headed by George L. Berry of Cadiz. It was owned by the Hillman estate, included the old furnace and 5000 acres, and was sold for \$40,000.

The Operating Value of Cost Systems

Departmental Costs Should Be Open to Subordinates-Special Materials Should Be Avoided Where Possible-Day Work Is a Detriment

BY G. W. MIXTER+

To clearly present a systematic discussion of the subject of this paper it will be necessary to briefly review and illustrate a skeleton of accounting methods. Referring to the accompanying diagram:

A represents productive material which is actually incorporated in the product that is shipped out of the

B is productive labor, or that portion of the payroll that represents directly labor which can be charged against individual products.

C, or non-productive labor, is the remainder of the payroll, such as foremen, engineers, toolmakers, etc.,

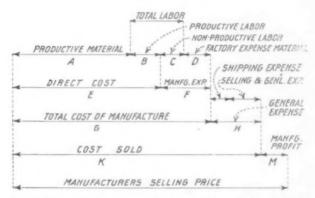
superintendents, etc.

D, or factory expense material, is assumed to mean every expense not covered by the above, such as coal, oil, emery wheels, insurance, taxes, workmen's compensation, etc.

F, or manufacturing expense, is the non-productive

labor plus the factory expense material.

or general expense, is shown as including expense of advertising, selling, shipping and general manage-



Cost Diagram Illustrating the Basic Factors which Must Be Considered in Arriving at Manufacturer's Selling Price

The mechanism of keeping the detailed records is infinite in variety, all too often overdone; but under-

lying all are certain basic principles.

Cost factors must be boiled down to enable sim plicity, and then continual comparison and study will point the way to improvement. Nor will this improvement be limited to one element of cost. Real, analytical cost knowledge will lead to well rounded development. Many of the older industries were very one-sided in their development—leading always toward refinement along lines most congenial to the founder or owner. Facing all elements of cost will force attention to all sides of the problem.

Neither are costs of much value if they represent The returns must be prompt or the rofit thereby is lost. In fact, many ancient history. opportunity to profit thereby is lost. expense items are much better controlled by working to a budget laid down in detail before the expense is This is especially true when facing a falling incurred. volume, which is the most difficult time to control ex-

pense.

It is a most common error for an executive not to take into his confidence his subordinates, or, to use a If the cost facts help the exbetter word, associates. ecutive, they should help the entire organization. properly arranged, this can be done without showing a

*From a paper presented at the convention of the National Implement and Vehicle Association, Atlantic City, N. J., Oct. 19, 1916.

†Vice-president Deere & Co., Moline, Ill.

department head figures beyond his department. However it is handled no cost system is getting the maximum result unless it is understood by the organization. Costs are a map of what goes on in the factory. They furnish the means of understanding and controlling, and as such should be freely shown to the men who control the details.

LEDGER A VITAL POINT

Having in mind the general principles and definition of the terms involved, you should realize the vital necessity of a proper classification of the ledger accounts, and a correct distribution of the items to the various accounts.

It is not only necessary that the accounting be correct at this point, but the manager and the operating men must have a clear understanding of the resulting skeleton; especially the class of items included in each account and how the various accounts build up into the cost of the individual implement. It would be far better to carry only five accounts, each representing one of the five sections in the cost diagram, and carry them clearly, not only on the books, but in the mind of the management, than to have a mass of detail intelligible only to a certified accountant.

The underlying principle of distributing expenditures to the various accounts is that all charges to a given account must belong in the same division of our cost diagram. A simple example is found in two kinds of steel-common bars for the typical implement which we are going to discuss must be charged to an account in the raw material (A) group. Tool steel must be charged to an account in the factory expense material

(D) group.

The importance of accurate and honest accounting cannot be overestimated. Accuracy requires proper classification and distribution. Honesty means charging everything to expense that belongs there. Do not deceive yourself by capitalizing expense-do not tamper with the depreciation charge-do not inflate your in-

Productive material (A) for our purposes has been defined as the material actually incorporated into the product that is shipped out of the plant. This paper has nothing to do with the base price you pay for material. That is the buyer's business, and at present the subject is too disagreeable for discussion.

To figure the cost of material for a given implement we must have a specification or bill of material. You cannot manufacture an implement without knowing of what it is made. You must have proper specifications before you can even order material accurately, and good specifications, prepared by some easy duplicating process, will help every man on the job. In short, the expense of accurate, complete specifications is not chargeable to the expense of a cost system.

SPECIAL MATERIALS SHOULD BE AVOIDED

Rightly used, information of detailed cost of material will save on the material cost, and the time to begin is before the final design of the tool is accepted. Economy of material, assuming the base price already fixed, is obtainable only from efficient use of the material, i. e. the lowest priced material that will do the work-and not too much of it. Right at the start is the time to eliminate steel sections not ordinarily carried, or special sections only obtainable from one or two Teach your designers to use material of commercial specifications.

Theoretically, defective material, scrap and excess cost of material purchased above the contract prices to meet as emergency demand, are charged to expense, and are included in manufacturing expense. Practically this ideal is never reached, and in starting a cost system a flat addition of 5 per cent to the productive material a found from the specifications is recommended.

as figured from the specifications is recommended.

Throughout this paper the total cost of either gray iron or malleable castings is considered as productive material (A); i...e., as if purchased from an outside source. Good practice requires that foundries be operated as separate business organizations. Time prohibits detailed discussion. Indeed, the subject warrants a separate paper, as knowledge of and comparisons of details are perhaps most profitable in the foundry. From purely a cost finding viewpoint, assuming proper classification and distribution of the ledger accounts, simply dividing the total material, labor and expense for a year by the good castings produced gives a cost, crude in its simple exactness but, of course, of little use as a force to reduce future costs.

DAY WORK VS. PIECE WORK

To apply any cost method two facts must be determined about direct labor:

 The productive labor on each specific implement whose cost is to be figured.

2. The proportion of productive labor in the total

payroll.

The productive labor (B) for a specific implement requires that we know the cost of each operation on each piece; and each of the assembling operations must be known.

Where any considerable part of the productive labor is day-work you face a real difficulty, not insurmountable, but requiring special treatment and special expense. The real remedy is to eliminate the day-work. The employee will receive higher wages and the work cost less. Day-work stands for inefficiency and unhappy men. Few realize how absolutely a determined resourceful superintendent can eliminate day-work.

For brevity, we will assume this productive labor is largely on a straight piece-work basis, as is true in most implement plants. The setting of piece-work prices and providing a proper record of these prices for employees and timekeepers is a vital operating matter, but has nothing to do with cost accounting. Given the existing piece-work lists, it is necessary in some way to assemble a list of all the operations on each piece together with price per hundred for each operation. This is clearly chargeable to cost expense. It is easier to carry this on a separate page, or card, rather than in detail on the specification costs, because many pieces appear repeatedly on different specifications.

To do this work rapidly, and to easily transfer the results to the cost sheets, absolutely every different part produced or worked on in the plant must carry a number. This is not only necessary for easy cost accounting but for many obvious reasons.

The second class of information about direct labor, the proportion it bears to the total payroll, is the direct result of a proper payroll distribution, which also gives the nonproductive labor.

IMPORTANCE OF PAYROLL DISTRIBUTION

The subject of payroll distribution opens a most vital, and perhaps a most helpful part of our discussion and warrants close attention. No part of cost accounting is so fruitful of possible economies, nor so generally neglected by the operating men. Promptly available each week by departments, and freely shown to the foremen concerned, it is an invaluable operating asset. Postponed to the middle of the following month and kept hidden by the bookkeeper, it is an accounting relic.

Payrolls are made up from some form of time slip, preferably returned each day filled in by the employee himself. Evidently the expense of checking the time slips and making up the payroll is an expense not chargeable to cost accounting.

Distributing the payroll is a cost expense, just as

Distributing the payroll is a cost expense, just as vital to correct costs as computing the productive material or the productive labor for an individual implement. But this expense also provides a vital moneymaking necessity to the operating men.

The expense of proper distribution does not add more than 60 per cent to the time-keeping expense. For a complicated plant of 1500 men, the cost of distribution is \$1,200 per year. Another plant with 400 men spends \$300 per year for this purpose. Properly handled 75c, per year per employee covers this expense.

handled 75c. per year per employee covers this expense.

As a result of distributing the payroll you have—
First, your payroll divided between productive labor and non-productive labor, which gives the basis for the proper distribution on the ledger, and without this you cannot compute costs.

Second, you have the percentage of productive labor to the total payroll. This figure is not directly used in cost accounting, but is of infinite value.

A foreman need not be a bookkeeper to understand the difference between productive labor and the non-productive remainder; and a very little guidance will lead him to examine with interest the weekly distribution for his department. In a sense, you can make him your business partner, and do so without making a cheap clerk of a high-priced foreman.

WHAT SYSTEM MEANS TO DEPARTMENT HEADS

This paper is primarily a plea for clear thinking. We are in the midst of conditions more difficult than ever before faced by the implement industries. We are all learning and the Federal Trade Commission is helping us to understand that often the way to help ourselves is to help others. It has not been my intention to suggest that foremen and superintendents should become bookkeepers, but that they should think clearly; and analyses similar to those suggested make clear thinking possible.

Compare the position of a superintendent with a proper payroll distribution available every week with a man who is going blind with nothing more than the total of the payroll in his mind. Or consider the sales manager who does not know the relative profits derived from the various lines of goods and has no analysis of the money he spends to sell the goods. Then finally consider the position of the manager or owner who knows that things are going wrong and cannot tell why.

Remember that costs do not cost much, and they pay. The McCormick Works use five men on the cost of the product of 8000 men. The Deere & Co. plow department uses one and one-half men on the cost of the product of 1500 men. Not less than 80 per cent of the clerical help and expense often charged against a cos; system would be required to properly operate a plant under the old "guess what you are doing" plan. Is not the additional money paid out really a profit rather than an added expense? And is not this profit multiplied many times? Know your business and you can stop the leak before the boat sinks.

Safe Practices in Ladders

A compilation of the best information on what it calls "Safe Practices" is to be undertaken by the National Safety Council. This information is to be published in loose leaf form, so that fresh information can be added from time to time, but apparently the idea is to take up one particular subject at a time and treat it somewhat exhaustively. The first contribution of "Safe Practices" has appeared and has to do with ladders, both stationary and portable. It covers the materials of construction, the methods of testing and certain safety features provided in connection with ladders. The headquarters of the Council, of which W. H. Cameron is secretary, are the Continental and Commercial Bank Building, Chicago, Ill.

A Steel Treating Research Club is in existence in Detroit, and its name indicates its interests. It meets in the rooms of the Detroit Engineering Society, 46 West Grand River Avenue, Detroit. C. Newman Dawe, Studebaker Corporation, is president, and H. G. Kiefer, Timken Detroit Axle Company, is secretary and treasurer. C. C. Brown, Detroit Engineering Society, is serving the club as assistant secretary.

A COAL UNLOADING MACHINE

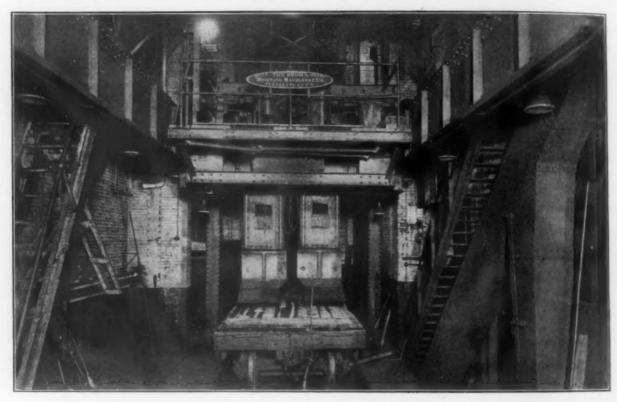
Frozen Coal Cleared from Cars by Motor-Driven Scrapers and Air Hammer

A coal breaking and unloading machine designed primarily for unloading cars in which the coal has frozen is being built by the Brown Hoisting Machinery Company, Cleveland, Ohio. It is said to be a very useful machine at any time of the year, as it unloads a 50-ton coal car in 5 or 6 min. by forcing the coal from the car into the track hopper and is useful in steel plants and other establishments using large quantities of coal.

This machine was designed and patented by J. P. Considine, engineer with the Edison Illuminating Company, Detroit, Mich., to speed up the unloading of coal in the plant of that company.

doubled-flanged wheels which run on the top of the runway girders and is driven by a 22-hp. adjustable-speed motor through pinions that mesh into racks fastened to the bottom of the girders. Another method for propelling the machine is by cables dead ended at each end of the runway and connected to the traveling motors on the machine. Either of these arrangements is relied upon to afford a positive drive that does not depend upon the tractive effort of the flanged wheels. The travel motor is provided with a solenoid brake for promptly arresting the high-speed parts of the mechanism when the current is shut off. A limit device is also provided for the travel mechanism, to prevent running off the runways.

The carriage carries two spuds, each weighing $4\frac{1}{2}$ tons and hung by a cable. In the spud above the anvil block there is a double-acting air hammer



A Coal Breaking and Unloading Machine Designed for Use with Cars Containing Coal That Has Been Frozen or Will Not Flow Through the Bottom Hoppers Readily for Any Other Reason

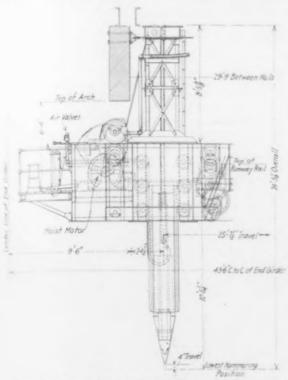
Considerable difficulty was formerly experienced in unloading a sufficient amount of coal to meet the load demand at its powerhouse during the winter season when the coal had become frozen, often at the top and bottom of the car for a distance of about 2 ft. and frequently throughout the entire depth. In either case the coal would not flow from the car when the doors were opened and it would be necessary to force an opening by driving a small pipe with a hand hammer through the frozen coal at several places, which required from 30 to 90 min. After an opening had been made the coal was loosened by picks, but the whole work of unloading a car would require from 11/2 to 4 hr., depending upon the extent to which the fuel was frozen. The coal breaking machine has been in successful use at the Detroit Edison plant over 2 yr. and one of the machines is now being installed at the Youngstown works of the Republic Iron & Steel Company.

The coal breaking mechanism and scraper consists of a carriage supported by and traveling longitudinally on a girder runway and two spuds with air hammers carried by the carriage. The carriage, weighing 15 tons, is held in position by four

weighing 3400 lb. to which is connected a flexible air hose. The two spuds occupy approximately the full width of the car. One or both may be operated at a time, being raised by one 52-hp. adjustable-speed motor. The hoist motor is provided with a solenoid brake, and there is a limit device to prevent overhoisting.

In the halftone engraving the spuds are shown lowered to a position at which the elevation of the lower ends corresponds to the height of the car floor. When the machine is not operating the spuds are carried at the highest position, the lowest extremity being on a line with the bottom of the carriage. As shown the bottoms of the spuds are cut out at the inner side, thus allowing them to clear the center beam on hopper bottom cars. A small portion of the coal escapes through the opening between the spuds, but this is negligible in amount and can be removed quickly with shovels. Details of the construction are shown in the sectional view of the side elevation.

When a car is to be unloaded it is placed over the hopper and the doors dropped. If necessary, as in the case of frozen coal, the spuds on the machine can start the coal flowing through the doors. The machine is run to one end of the car and the spuds lowered into the coal and then the machine is run forward, scraping the coal toward the doors and



A Side Elevation Showing the Air Hammer Arrangement Employed to Start the Coal Flowing

forcing it into the hoppers. This is repeated on the other end, from 5 to 6 min. being required to clean the car.

New Non-Metallic Gears and Pinions

As a substitute for gears of steel, cast iron or bronze, the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., has developed a non-metallic gear material. It consists of heavy duck bonded together with Bakelite by heating and is known as Bakelite Micarta-D. Besides minimizing noise, the gears are found capable of being used in oil without signs of swelling, and no bushings or shrouds are needed, as the material is self-supporting and free from the influence of atmospheric changes.

The material, it is stated, polishes readily, and may be machined at high speed in any direction and drilled and tapped. When teeth are being cut, the same tools are used as for steel, but an increase of 25 per cent in cutting speed and one of 50 per cent in feed are possible. The material has a tensile strength parallel to laminations of 10,000 lb., and a compression strength of 30,000 lb. perpendicular to the laminations and 17,000 lb. parallel to the laminations. The gears may be used for the main drive of punch presses, boring mills, engine lathes, pumps and crane motors and for general machine shop service and automobile timing gears.

The United States Bureau of Standards has completed a careful determination of the freezing point of mercury and the result of the work gives —38.87 deg. C. (—37.97 deg. Fahr.) for this temperature. The fixing of this freezing point is of great importance to thermometer makers, as it marks the lower limit to which a mercury thermometer may be used and furnishes a method of calibrating or pointing the scale below 32 deg. Fahr. As far back as 1862 the English Government, recognizing the importance of this knowledge, appropriated £150 to have it determined. The value then reached was —38.85 deg. C. (—37.93 deg. Fahr.), and this agrees with that obtained at the Bureau of Standards. Other determinations made before and after this early work threw some doubt on its accuracy.

Changes and Progress in the Malleable Castings Industry

The use of malleable iron castings for trucks, underframe and center sill parts, car bodies, etc., was discussed at length by F. J. Lanahan of the Fort Pitt Malleable Iron Company, Pittsburgh, in a paper before the American Foundrymen's Association at its annual meeting in Cleveland, Ohio, Sept. 14, 1916. The title of the paper was "The Use to Which Malleable Iron Castings Can Be Applied in Car Construction." For castings that are used to join individual sections together the author recommended malleable iron castings because of their superior quality.

The conclusions of the author were as follows:

Malleable iron has been misunderstood and frequently criticized in the past, partly on account of incompetent and careless manufacture, but largely, too, because of the customer's insufficient knowledge concerning it. During the past few years, the industry has undergone a complete change, and the process and practice to-day is far in advance of the haphazard system followed three or more years ago.

As an illustration, each foundryman formerly had his own analysis for the raw materials, and the same idea governed the finished castings. Neither analysis was based on any scientific knowledge, but simply what this or that individual thought was right. In contrast with such practice, the modern method is to follow a standard pig-iron analysis, for a uniform result in the finished product, depending on the purpose for which castings are to be used. The standards so set are the result of a long series of metallurgical, chemical, mechanical and other scientific tests.

Customers can readily understand how necessary it is for a manufacturer to know exactly where the castings are to be used, and under what conditions, so that he may determine what particular feature should be developed as the casting's strongest characteristic.

The malleable industry to-day is divided among specialists, each catering to the production of a definite class of material, such as railroad, automobile, agricultural, stove, pipe-fittings and miscellaneous lines, the main object being to perfect castings for the purposes intended through a careful study of the work they must do, as well as by concentration in one particular line, to effect economies through efficiency, and make the selling price as low as possible. In designing castings, great care should be taken to have the section of metal sufficiently thick to perform the work required, otherwise failure will inevitably follow, not because of any imperfection in the iron itself, but owing to the fact that it is too thin.

Commendable solicitude on the part of engineers in their effort to obtain minimum sections, so as to reduce weight, and consequently cost, has in the past resulted in condemnation of the material, when the real trouble was caused by insufficient metal. In this respect, it is wise to follow good engineering practice, by figuring theoretically and designing practically, bearing in mind the extremely difficult service demanded at times, erring if at all, on the safe side, by having ample metal thickness to meet the requirements.

The engineer knows when preparing a new casting just what is required of it, and if he would make it a practice to utilize the foundryman's experience and knowledge, so that in addition to the proper design, the correct section of metal is designated, to satisfactorily accomplish the task required, it would eliminate many of the pitfalls and troubles of the present day. Unwarranted criticism of the manufacturer, who is blamed for faults he is actually not responsible for, would disappear.

Wisdom dictates the selection of a reliable and progressive malleable manufacturer, since this will insure conscientious attention to every detail of the casting process, and the customer will have confidence in knowing that he will get, in material, service and satisfaction, precisely what has been agreed upon, instead of a slip-shod and imperfect substitute.

The Ames Iron Works has removed its Boston office to the Penn Mutual Building, 24 Milk Street.

Safety Congress at Detroit Last Week

The Special Problems of Foundries, Coke Ovens and Rolling Mills-Employment Departments and Health Supervision and Insurance

BROADENING of the scope of the organization was shown by the attendance at the fifth annual safety congress of the National Safety Council held at the Statler Hotel, Detroit, Oct. 17-20. the registration, which was close to 120 about the same as that of the Philadelphia Congress a year ago, the aggregate attendance was said to be much larger. At the Philadelphia meeting the local registration was quite large, but it was not conspicuously so at the Detroit meeting. It was stated that the attendance at most of the sections was considerably larger than a year ago.

Fourteen separate sessions were held during the congress and some of these, like the iron and steel section, held meetings on three different days. Three new sections were organized during the congress, one on copper, lead and zinc smelting, one on rubber, and a third covering building contractors. A new feature of the meeting was a creditable exhibit of safety devices, which was inspected by most of those attending the various sessions. It has not yet been decided whether the exhibit will be made a permanent feature

of these meetings.

If the recommendations made in papers and discussion in the health section are followed, the plant physician will be made to occupy a much more important position in the plant organization than he has in the past. He will not only thoroughly examine men when they are employed, but will keep them under close inspection and help in placing workmen in places where they are best fitted physically.

OFFICERS ELECTED

The election of officers resulted in the selection of Lew R. Palmer, chief inspector of the Pennsylvania Department of Labor and Industry, Harrisburg, Pa., as president. He has been first vice-president.

Van Schaack, director of publicity of the Aetna Life Insurance Company, was made first vice-president; H. W. Forster, general manager of the Independent Bureau, Philadelphia, second vice-president; M. A. Dow, general safety agent of the New York Central Lines, third vice-president. Secretary-Treasurer W. H. Cameron was re-elected and his title was changed to manager and treasurer. J. J. Lamont was re-elected as assistant secretary.

Among the directors elected were the following: Melville W. Mix, president Dodge Mfg. Company, Mishawaka, Ind.; Arthur T. Morey, general manager, Commonwealth Steel Company, Granite City, Ill., the retiring president; H. H. Robertson, Asbestos Protective Metal Company, Pittsburgh; Francis P. Sinn, New Jersey Zinc Company, Palmerton, Pa.; S. W. Tener, manager, accident and pension department, American Steel & Wire Company, Cleveland; J. M. Woltz, safety director, Youngstown Sheet & Tube Company, Youngstown, Ohio; Earl B. Morgan, safety engineer, Norton Company, Worcester, Mass., and C. L. Close, manager of bureau of safety relief, sanitation and welfare, U.S. Steel Corporation, New York.

Among the new members of the executive committee are Geo. T. Fonda, safety engineer, Bethlehem Steel Company, South Bethlehem, Pa.; L. M. Eaton, director of safety, Cadillac Motor Car Company, Detroit, and

S. W. Tener.

NEW UNIVERSAL DANGER SIGN

A new red, black and white universal danger sign was adopted at a special meeting held to consider this This has a large round red center sursubject. rounded by a black bordered square with wide black bars reaching from each corner of the square to the red center, leaving conspicuous white spaces between the red center and black portion on each side of the sign.

Safety in the Foundry

The foundry section held only one meeting, but in the time available a great deal of interesting information was brought out in papers and accompanying discussions. Injuries that occur most frequently in foundries, safety education, the protection of eyes, the dangers due to use of alcohol, and welfare were among the topics. The report of Earl B. Morgan, secretary of the section, showed that the membership had increased from 37 to 73 during the year. O. H. Fehling, manager of the National Malleable Castings Company, Chicago, Ill., was chairman of the foundry section.

New officers were elected as follows: F. G. Bennett, safety department Buckeye Steel Castings Company, Columbus, Ohio; vice-chairman, F. W. Shepard, safety inspector, American Cast Iron Pipe Company, Birmingham, Ala.; secretary, S. W. Ashe, educational and welfare department, General Electric

Company, Pittsfield, Mass.

GENERAL ELECTRIC FOUNDRY AT PITTSFIELD

The first paper was presented by S. W. Ashe, who told of safety work in the Pittsfield, Mass., plant of the General Electric Company. The title of this paper was "Strains, Sprains and Burns." He said that the weight of the ladle is of great importance in eliminating the spill of hot metal in the foundry. Pittsfield plant a 45-lb. ladle and a traveling crane ladle are used for handling hot metal. In addition to the use of the usual safety devices, lectures on safety topics are given to employees. Because of the rapid

changes in the ranks of the employees, educational work has to be done over and over again, perhaps every four or five months.

The educational campaign, he said, must be made personal matter with the men. Ordinary safety literature would not accomplish the purpose. The plant is able to get into personal touch with its employees by means of a works paper, 6000 copies of which are distributed monthly. If the men cannot read, they take it home and their children read it to them and it is found that the men quickly become interested in the Illustrations are freely used showing the right way and wrong way of doing things, so that the men can understand the teachings of the photographs without written explanations.

The policy of the General Electric plant is not to hire a man who has a hernia or a tendency to hernia, but this policy cannot be followed when men are as scarce as at present. The next best thing is to hire these men and instruct the foreman to place them Requiring such where they will not do heavy lifting. applicants to sign a release for injury claims was recommended. While these releases are not legally binding, they were found to have a moral effect and to cut down the number of claims for injuries 50 per cent. He said that out of 4000 men hired since January, 156 had hernia. Another foundryman remarked that his experience was that 6 per cent of foundry employees were so afflicted.

In reply to a question as to providing and inspecting

shoes, Mr. Ashe said that at his plant arats were made with a local shoe dealer to range nese shoes, as the dealer could furnish them The company gives the than the company. a ticket which entitles him to a 20 per cent emplo: at the store handling the shoes, making an inducement for the molder to get his shoes at that store and giving him a price advantage over a man not an employee of the company. Attention to the need of molders' shoes is called through lectures and lantern If a man not wearing a regulation shoe comes in with a foot burn, his foreman is taken to task for allowing him to wear other shoes. The matter is also given attention by the safety inspector. The policy, however, is to use persuasion in this matter rather than compulsion.

CRANE CHAINS

F. H. Elam, manager of the casualty department of the American Steel Foundries, Chicago, spoke about crane and chain practices. He pointed out that most chains were of lighter material than they should be for the service required. Annealing chains did not generally remove defects, and the only excuse for annealing in most cases would be to show to the foreman that a chain is too light, this being evidenced by the elongation of the link under a load after annealing.

The annealing of crane chains was also discussed in the steel section where it was declared that safety was not assured by annealing, but that proper annealing would at least do no harm. However, if improperly done it would be of no value. A careful daily inspection of chains was urged. The announcement was made that the council will issue shortly a bulletin giving the latest available information on the annealing of chain.

The use of cable in the place of chain for hoisting was recommended, in the discussion of Mr. Elam's paper, as a safety measure, doing away with the danger of a chain breaking. The use of a cable for sling purposes was favored, but the statement was made that no cable is now made that is satisfactory for this use, because there is none on the market that does not twist.

Secretary Morgan announced that the Safety Council would issue shortly a bulletin on crane brakes.

EYE PROTECTION

F. W. Shepard, in an address on eye protection, declared that ignorance and carelessness were the leading causes of injuries to eyes and characterized abnormal vision as the greatest cause of accidents. advocated more sunshine in foundries, saying that it would have a psychological effect on the workmen, making them more cheerful and increasing their production. He warned against the use of an unsterilized instrument for the removal of foreign substance from the eyes and declared that with the improved goggles now being made, workmen could no longer complain that they could not see through their goggles.

A dust-collecting system is being installed at the Birmingham pipe plant of the American Cast Iron Pipe Company, with which he is connected, and he expected the removal of the dust from the foundry would be of great protection to the eyes. In reply to questions he said that in case employees require specially fitted goggles, the company pays for the examination of the eyes. He did not consider glasses in place of goggles

safe in the foundry cleaning room.

THE FACTORY RESTAURANT

An address on "Alcohol vs. Safety," by Dr. H. P. Hourigan, Larkin Company, Buffalo, N. Y., brought brought out some discussion of factory restaurants, the statement being made that to promote temperance, a shop must compete with the corner saloon and supply good food. However, during the discussion some doubt was expressed as to whether it was worth while to maintain such a restaurant, if its operation causes a loss of from \$200 to \$300 a month.

A representative of the National Cash Register Company, Dayton, Ohio, told how his company handles the restaurant problem and keeps its employees out of saloons during the noon hour. Meals are furnished to the men at 20 cents each, and a motion picture show is provided in an auditorium where men may partake of lunches that they bring from home. He said that about all the employees who did not live near enough to go home for their lunches either patronized the company's restaurant or took their lunch pails to the auditorium

Iron and Steel Section Meetings

In the papers and discussions in the iron and steel sectional meetings, information was brought out regarding safety methods in mills and coke oven operation, and the relation of the labor problem and welfare The report of J. M. Woltz, safety director Youngstown Sheet & Tube Company, chairman of this section, showed a large increase in membership and stated that the standardization committee had done excellent work in preparing rules on standardization of work methods, safety guards, etc.

New officers of the iron and steel section were elected as follows: Chairman, George T. Fonda, safety engineer Bethlehem Steel Company, South Bethlehem; vice-chairman, Earl B. Morgan, safety engineer, Norton Company, Worcester, Mass.; secretary, A. H. Young, supervisor of labor and safety, Illinois Steel

Company, South Chicago.

DECLINE IN STEEL MILL ACCIDENTS

The first address before the iron and steel section was by Dr. Lucian W. Chaney, United States Department of Labor, Washington, D. C., who in a talk on progress of safety in the iron and steel industry, showed charts on lantern slides indicating the decline in accidents in steel plants and the effectiveness of the use of safety methods.

a paper on safety in blast furnace operation, F. H. Wilcox, engineer, United States Bureau of Mines, Pittsburgh, presented an analysis of the cause of blast furnace accidents. Hand labor, with 17.9 per cent, headed the list. From observation in many plants, it appeared that although thoughtlessness and carelessess of the men is the major cause of accidents, the desultory, haphazard and unsystematic manner in

which much of the work is done contributes almost as It was pointed out that a blast furnace employee has to do a variety of occasional tasks and that these are not always performed in the best way, particularly because these tasks are frequently carried out with insufficient instructions and supervision. Training in effective method of work was advocated as the way to promote safety about a blast furnace plant.

Safety in Bessemer operations was discussed by H. Ayres, superintendent of safety, sanitation and welfare, National Tube Company, McKeesport, Pa. He said that there were more accidents in Bessemer plants than in any other branch of the steel industry, as shown from Federal statistics covering 135 plants. Hand rolling mills came second, open-hearth plants third, mechanical mills fourth, and blast furnaces fifth. An analysis of the accidents in Bessemer plants showed that 61 per cent of the injured were laborers, that explosions of hot metal caused one-fourth of the accidents, and falling and flying material one-third of

In many steel works attention has been given to systematic work for the elimination of injuries, and there has been a marked improvement in that respect. In one plant instead of 35 per cent of the employees being injured, this number has been reduced to 5.01 per cent. He referred in particular to one means of reducing accidents in Bessemer plants, and that is the use of the open top type of molds, eliminating the danger of explosions of hot metals and spills that occur

in plants using closed top molds.

Following a paper on the general subject of safety in open-hearth operation by James Thorpe, superin-

tendent of open-hearth furnaces of the Illinois Steel Company, Gary, Ind., the details of safety in the construction and operation of open-hearth steel plants were discussed by Walter Greenwood, safety inspector, Carnegie Steel Company, Youngstown, Ohio. He said that the first step in safeguarding open-hearth plants is to comply with the standard regulation for covering moving parts, isolating dangerous machinery, etc., sup-



L. R. Palmer, President National Safety Council

plying necessary appliances for the protection of men doing dangerous work. These include goggles, inhalation devices and asbestos suits.

He declared there is a chance for improvement from the safety standpoint in the arrangement of building, lighting, ventilation, walks along crane runways and location of trackage and storage facilities, where they would cause the minimum interference with the workmen. All equipment for mixers should be electrically operated, eliminating many of the dangers present when a mixer is operated by hydraulic pressure. The doors of an open-hearth furnace should be operated with motors set on platforms back of the furnaces. Hinged shields attached to counterweights should be provided for covering tapping holes, while tapping out. Operators of charging machines should be protected with shields.

The fact that the steel industry was the first to take up the safety movement and also to put safety engineering on a permanent basis, was mentioned by Dr. F. L. Hoffman, statistician, Prudential Life Insurance Co., in a paper on the achievements and possibilities of accident prevention in American industry. He presented figures from records of several of the steel companies to show that there has been a large reduction in the percentage of injuries during the past few years. According to his estimate, 25,000 lives were lost and 300,000 were seriously injured in the steel industry three years ago. He said that to-day it is estimated that the number of killed annually in this industry is 22,000, and the number of cases of serious injuries has been reduced to 260,000.

THE MODERN EMPLOYMENT DEPARTMENT

The functions of a modern employment department in the steel plant was discussed at length in an interesting paper by A. H. Young, supervisor of labor and safety, Illinois Steel Company. He declared that the development of the modern employment office is not

less interesting than, and is as fully worth while as, the growth of the safety-first movement. The employment bureau of to-day has the responsibilities far outweighing the mere supplying of labor and the maintenance of service records. When properly conducted it will provide an employee for each of the varying occupations. It will discover the worker not fitted for his task and find the task fitted for the worker.

He said that the weaving of health and occupation has never before been so fully discussed as during this congress; but when the questions of medico-occupational fitness are answered, it will remain for the employment bureau to actually work out the solution from the formulas presented. In the maintenance of service records he contended that when a man leaves the plant the true cause of his action must be made a matter of record, in order that the employment agent can conserve desirable workers in a plant. Except for his vigilance, foremen may improperly discharge a man or unfair conditions easily adjusted may cause him to resign.

The superintendent of a modern employment office must be a keen student of human nature, and have a sufficient force of interpreters and clerks so that he will be free to spend all of his time on the larger responsibilities of the office. He must know the location of groups of foreign settlements in the community, and must become personally acquainted with the boarding bosses, steamship agents and others with whom the immigrant maintains a close contact, as these are his supply depots. No less exacting is the duty of keeping closely in touch with all the foremen in the plant, so that he will know the varying character of the duties of each job in each department. He must also be prepared to fill all the demands made on him for men and technical experts, and must establish his line of communication to these centers of supply. most progressive of modern business organizations, the manager of the employment department is given very extensive and final authority. In hiring laborers and filling other places of minor importance he passes final judgment and hires or rejects the man directly. other cases he retains jurisdiction as to eligibility in all details except as to skill.

Physical examination of employees, he said, was properly another item of employment detail. Usually the complete report of the physical examination is kept in the surgeon's file and only a grade symbol is used in the employment office. The first routine of the employment office, when a man is hired, is the preparation of a service record card, which is kept on file in the employment office. At the South Chicago Works, a man is given a permanent number on his card, and if an ex-employee returns he retains his old number. This simple scheme enables the employment department to determine quickly the number of new men hired during any given period, as new employees are assigned consecutive numbers.

In a paper on the origin of safety methods and prevention of infection, Dr. C. C. Booth, chief surgeon of Republic Iron & Steel Company, Youngstown, declared that it is about as essential to examine men physically for employment as it is to make machines safe to operate. Men incompetent mentally are often injured by leaving safety devices on machines misplaced. While he did not believe that a minute physical examination is necessary, he declared that it is unfair to allow a man to work in an industry if he has certain bodily infirmities that would make him liable to further injury, and that it is unfair to other employees to engage a man to work among them who is suffering from tuberculosis or any communicable disease or infection.

SAFETY AT COKE-OVEN PLANTS

In a paper on safety in coke oven operations K. M. Burr, safety inspector, Illinois Steel Company, declared that because of the increase of accidents in coke oven operations it is time to devote more attention to safety in this field. He said that a government report for 1915 shows that in 38 by-product coke plants, 17 per cent of the employees were injured. At the Gary plant the rate was about one-third of that, but it was felt

that even this rate was higher than it should be. At the Gary plant analysis shows that the hand-labor accidents amount to 35.54 per cent of the total, that 22.89 per cent are due to burns and 16.80 per cent are due to falls. He believes that with the exception of injuries to the eyes, due to flying particles, at least 90 per cent of the accidents were due to the carelessness of the injured workman or others.

He mentioned some of the provisions for safety at the Gary plant, among them the following: At the coal unloading station derails are installed to prevent bumping cars on which unloading crews are working. Steel platforms are provided at the sides of the tracks from which much of the work of poking down the coal in the cars is done, and these furnish a safe and easy way for a man to get into the car. Cables are stretched across the hoppers, preventing men from falling into them. Open lights are not allowed in the crusher building or in the coal conveyor enclosure. Push button stops are provided at convenient places for conveyors. On the ovens the larry cars are equipped with fenders and automatic bells. The chutes are so constructed that when charging a hinged extension swings into place, reducing to a minimum the amount of coal still around a charging hole. The coke is not quenched at the ovens, but is taken in transfer cars to a quenching station.

Mr. Burr attributed the high accident rate in coke oven operation to the fact that a large amount of unskilled labor is employed, and the change in operating forces is high, resulting in a large percentage of new men. He held that safety in coke oven operation must begin with the employment of men, care in this respect being a great factor in assuring permanent forces. With the same object in view, conditions should be made as comfortable as possible. In fact, it is impossible to give too much attention to conditions that affect the comfort of the men. Safety committees were effective means of education, but the fact that such committees are active should not relieve the foremen of personal responsibility. Mr. Burr said that agitators are the most dangerous feature of a benzol-recovery plant, and they should by all means be kept out of the still building.

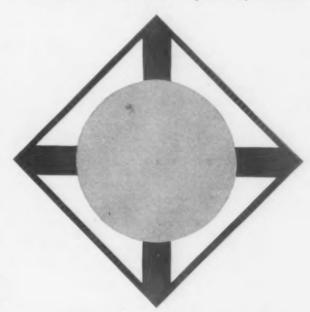
SAFETY IN ROLLING MILLS

In an address on safety in rolling mill operation Charles R. Hook, vice-president of the operating division, American Rolling Mill Company, Middletown, Ohio, declared there are three dominating factors that decide the extent to which the safety movement is successful. They are the company policy, the attitude of superintendents and foremen, and the attitude of the workmen. He found that the policy of companies was favorable to safety work, and they were backing this up with very liberal expenditures for safety devices and safety organizations, but that the results these large expenditures justify have so far not been secured. He believes that without exception the rolling mill companies are furnishing all the mechanical safeguards that can properly be used.

The most important problem in his mind is the building up of an organization of careful men, and he believed some companies have not given this matter sufficient attention. He said that the success of the safety-first movement depends largely on the conditions at home and that the company should interest itself in

every problem that will provide men with a sound body, clear eye and brain, and clear standard of morals. Employers should interest themselves in civic movements for better sanitation and better homes.

He did not find the attitude of superintendents and foremen all that could be desired. Too often these heads leave to the safety committee things they should do themselves or think their responsibility is ended



The New Universal Danger Sign—Black Square with Red Center

when they report an unsafe condition. In many cases they violate safety rules and this attitude is reflected in the conduct of the men. If he were a foreman and saw a workman doing something the wrong way he would demonstrate the right way rather than reprimand a man.

Mr. Hook's paper was discussed by P. R. Baker, assistant general superintendent Lukens Iron & Steel Company, Coatesville, Pa., who declared that the problem of safety in rolling mill practice resolves itself into one of carelessness of the lower class of workmen. In his plant by adding safeguards and by safety education; they have reduced accidents about 60 per cent. In spite of safety inspection work, further progress could not be made because of the carelessness of employees. A recent phase growing out of the present labor situation is the constant shifting of low-grade laborers, mostly ignorant of rolling mill work, going from one plant to another and indifferent to safety requirements. The Lukens plan of dealing with this labor is by keeping safety first before the men, with signs, posters, etc., hoping that they will absorb unconsciously some of the teachings.

In an address on electric hazards, D. N. Petty, superintendent of the electric department, Bethlehem Steel Company, thought that plant managers were going too far in placing danger signs on low-voltage apparatus. He believed that the men who had long worked around such equipment without serious injury would show a tendency to ignore similar signs around high-voltage apparatus.

Health Service in Industries

Among the most largely attended meetings were those of the health service section. The industrial surgeon, it was declared, is becoming a specialist in his field and close co-operation was urged between the plant doctor and the employment and production departments. Facts and arguments were presented to show that there has been too much discharging of men. Instead, a man who is not making good on a job because of certain physical defects, or for other reasons, should be put on other work for which he is found to be fitted.

An interesting paper was presented by the chairman of this section, Dr. Otto P. Geier, director of the employees service department, Cincinnati Milling Machine Company, on "A Human Side of Industry or the Scope of an Employee's Service Department." He said that out of the European war and the consideration of our own military preparedness has grown the conviction that industrial preparedness must precede military preparedness, that while lasting peace is supposedly dependent upon a high type of national preparedness, such preparedness is only possible with

a continued constructive industrial peace. Means must be found for the establishment of new points of contact between capital and labor. Many of the finest examples of co-operation between labor and capital are found in personal service departments. Such a department should begin its work along health lines.

In an outline of an employees service department, he included courteous service in the employment department, locker room service, medical service, including physical examinations and education as to the care of the body, sanitation, good toilet room facilities, good drinking fountains, light and ventilation, safety-first work, proper care of injured by plant physicians, an all-day clinic, dental services, sickness and death benefits, lunch-room service with good, clean food at a low cost, banking and loan service to encourage thrift and as a substitute for loan shark, education of the industrial worker and recreational facilities to contribute to the feeling of co-operation and good-will.

Dr. L. G. Shoudy, chief surgeon, Bethlehem Steel Company, in a paper on health education, declared that health education should be the foundation of all safety work and that this education must be started in the home and school. It is as important to protect the human body as it is to place danger signals around dangerous machinery. Employees should be taught to guard the human machine. The foremen should be taught to look after the men's health and to send them to the physician when they need attention. The superintendent should be taught to look after the heat and ventilation. Physicians and nurses should teach personal hygiene and use pamphlets, bulletins and the movies to promote good health.

A very complete system for the physical examination of employees used by the Peoples Gas Light & Coke Company, Chicago, was explained by Dr. Wilber E. Post, chief medical adviser of that company. Dr. E. R. Hayhurst, director of the division of industrial hygiene of the Ohio State Board of Health, in a talk on occupational diseases, said that such diseases should not exist. However, of health complaints, the occupational health complaints, such as strains, aches and pains were most frequent. He said that health conditions must be improved so that American plants would be in a better condition to meet foreign competition.

COMPULSORY HEALTH INSURANCE

A subject that attracted a great deal of attention was that of health insurance, which was discussed by A. W. Whitney, general manager, National Workmen's Compensation Service Bureau, New York City. He said that following the general establishment of workmen's compensation, health insurance comes before a public that is open-minded and ready to believe in it. However, various problems will have to be solved in placing health insurance in effect, such as whether it should be voluntary or compulsory and how the burden should be divided. A voluntary system has not been successful in Europe and he believes that a compulsory health insurance is warranted, as health is a matter of public concern. However, health insurance should not be adopted out of a public conscience but should have the approval of both capital and labor.

Various occupational diseases should be charged to the industries that cause them in the same way as industrial accidents are charged to the industries. Charging health insurance to the employer cause him to take an interest in the health of his employees. Both employer and employees must co-operate in the matter. He opposed the health insurance plan of the American Association for Labor Legislation for dividing the cost of health insurance among employer and employee and the State and having it administered by local mutuals. He believed that industries should bear the burden of health insurance, the cost being divided between capital and labor, with none or little of the burden thrown upon the State, and that the State machinery used in connection with workmen's compensation should be used to administer health insurance laws. In the discussion S. W. Tener expressed the opinion that before health insurance is provided the State should go much further in eliminating occu-pational diseases. The statement was also brought out that the average worker is not getting adequate

medical and surgical attention and that the price is prohibitive.

HIRING AND FIRING AT FORD PLANT

Some startling figures relating to the employment department of the Ford Motor Company was presented by Samuel S. Marquis of the department of education of that company in a paper on "The Company Doctor." Formerly at the Ford plant men were hired and discharged by the superintendent and foremen. Under this system 52,445 were hired in 1913 to keep up a force of 14,000 men. About 50,000 left, over 14,000 of these being discharged, the company's force of employees not being materially increased during that year. During the past fourteen months with an average of 30,000 men employed, only 5 men have been discharged and 5,680 left voluntarily. This remarkable change has resulted from the present system of taking the hiring and firing of men from the superintendent and foremen and transferring men from one department to another, or to different work in the same department. Often a man is transferred several times before work is found for which he is fitted.

L. A. Phelps, superintendent of insurance and maintenance, Avery Company, Peoria, Ill., gave a talk on employment, medical supervision and safety, advocating medical supervision of workmen so that they may be kept in good physical condition. He urged that the plant doctor keep in touch with the men. If one kind of work affected a man's health, he should be put on a different job. He advocated close co-operation between the doctor and the employment department and foremen. That his company has had little labor trouble during the present scarcity of labor he attributed to the system of employment, medical inspection and safety methods followed.

SUPERVISING OTHER THAN OCCUPATIONAL DISEASES

In a talk on industrial hospitals and dispensaries, Dr. R. C. Cabot, Boston, Mass., discussed the question of giving medical attention to workmen for other than occupational diseases. He thought that an admirable solution of this problem was for the family doctor to attend to cases of this kind and have the factory nurse visit the patient and make reports on his case to the plant surgeon so that the latter would know that the man was securing proper attention.

A further contribution to the subject of medical supervision of workmen was made in a paper by Dr. Harry E. Mock, chief surgeon, Sears, Roebuck & Co., Chicago. He presented in a diagram a plan for a health of employees or human maintenance department, which included a sanitary engineer, safety engineer, medical staff, visiting nurses and employees' advisers, all under the general manager. He said that this system could be employed in a plant employing all the way from 300 to 50,000 men. In the case of a small plant an employee could be taught to fulfill the duties of a sanitary and safety engineer and a physician devoting a small portion of his time to the plant could take the place of the medical staff. S. W. Ashe, General Electric Company, urged that plant managers come in closer contact with surgeons, as by so doing the latter would give very good advice regarding improving plant conditions. He thought if plant surgeons were given more authority much more would be ac-complished in health work. In this connection the statement was also made that plant physicians and surgeons would be able to accomplish much more if they become familiar with plant departments and manufacturing methods. While both medical supervision and physical examination were favored, the statement was made that physical examination in many plants is only a farce and that it should be made more thorough.

The Exhibition of Safety Devices

The commercial exhibit of safety devices was held in the Detroit Armory and was in charge of C. E. Hoyt, who has charge of the exhibits in connection with the convention of the American Foundrymen's Association, and E. C. Hall, who has long been his assistant in foundry exhibition work. Pictures of welfare and accident prevention work in and around Detroit were

shown by the Detroit Board of Commerce and a large educational exhibit was shown by the National Safety Congress. A model of its Detroit plant shown by the Ford Motor Company attracted considerable interest. Among the exhibits of interest in the iron and steel in-

among the dustry we're the following:
Allen Mfg. Company, Hartford, Conn., set screws;
Chicago Eye Shield Company, Chicago, goggles; Detroit
Fuse & Mfg. Company, safety switches; Commonwealth
Steel Company, Granite City, Ill., safety devices; The
DeVilbiss Mfg. Company, Toledo, Ohio, air system of
painting and varnishing; F. A. Hardy & Co., Chicago,
Julius King Optical Company, New York, and Strong
Kennard & Nutt Company, Cleveland, safety goggles,
etc.; Krantz Mfg. Company, Brooklyn, N. Y., safety
devices for electrical equipment; Mine Safety Appliances Company, Pittsburgh, safety appliances; MultiMetal Separator Screen Company, New York City, sand
blast helmets, etc.; New Jersey Zinc Company, safety
devices; Norton Company, Worcester, Mass., protected
grinding wheels; Oliver Machinery Company, Grand
Rapids, Mich., guards for saws and other machines;
Joseph T. Ryerson & Sons, Chicago, models of safe
stairs; R. P. Smith & Sons Co., Chicago, models of safe
stairs; R. P. Smith & Sons Co., Chicago, modelers' shoes;
Surty Guard Company, Chicago, guards for presses and
saws; Thompson Electric Company, Cleveland, cut-out
hangers for electric lights; Walsh Press & Die Company, Chicago, punch press guard.

A Record Car Shortage

The Railway Age Gazette, in an editorial in its current issue, publishes statistics showing that the shortage of freight cars on the first of October of this year was the greatest that ever existed on that date; but from an analysis of the reports of the American Railway Association for the last 10 years it finds that the peculiar conditions existing this year are such as to warrant an optimistic view of the situation. The net shortage as reported for Sept. 30 is 61,030 cars, distributed about proportionately to their numbers among all classes. The Gazette says:

"It is, of course, well understood that the reason for shortages occurring in October or early in November, if they occur at all, is that that month generally represents the period of heaviest grain movement. Somewhat paradoxically, this year it is the grain movement that has in part occasioned the shortage and at the same time kept the shortage from being worse than it On account of abnormal conditions prevailing in other countries there was a large early movement of grain by rail. There has also been a special demand for cars for other purposes, especially coal cars and gondolas. This created a demand for cars which afforded premonitions of a shortage earlier in the season than symptoms of shortage ordinarily appear. The net result of the early grain movement, however, was to afford relief for the condition of which it was a symptom. The extraordinary demands for equipment to carry other material would not have existed but for abnormal conditions abroad.

"But an outgrowth of the same cause that brought about the earlier movement of grain in 1916 reacted to slow down the movement later. The demand for grain for export coupled with a partial deficiency in the crop resulted in prices for some grains, particularly wheat, soaring to an unprecedented height. Many farmers are only now marketing their wheat at \$1.50 a bushel and many of them are still holding their supply for \$2.

"On the whole, then, this incipient shortage may be regarded with mixed feelings, notwithstanding the necessity of putting forth every effort to prevent it from growing to more serious proportions. It has been said before by the Railway Age Gazette that a car shortage is not all bad, because it is an unmistakable evidence of transportation prosperity. It is particularly so when by reason of unusual conditions the body of traffic that tends to cause a shortage is spread over such a period that the maximum of business may be handled with the minimum of disturbance. And under these conditions the precautions that are to be taken to prevent a threatened shortage from becoming a serious matter can be taken effectively with but little effort upon the part of each responsible individual."

POWER FOR STEEL MILLS

Analysis of Conditions Affecting the Purchase of Electrical Energy

From a report of the central station power committee of the Association of Iron and Steel Electrical Engineers, submitted at the recent meeting in Chicago, the following has been taken:

The rate schedule of 20 power companies furnishing power to steel mills has been obtained. To permit comparisons the net resultant rates for 1000-kw, and 5000-kw, loads at 50 per cent load factor were calculated, which calculations gave the following results:

Net	Rates per	KwH	r., 50	Per	Cent	Load	Factor
		2	daxim	um	Min	nimum	Average
1000-kw. 5000-kw.	demand .					700c. 667c.	0.9417c. 0.8464c.

The demand, including the effect of power factor upon it, is just as important a part of a proper rate schedule as is the energy charge. A mill with a load factor of 70 per cent and a power factor of 80 per cent or better can be served at much less cost than a mill having a load factor of 35 per cent and a power factor of 50 to 70 per cent.

Rate schedules should be as simple as possible and avoid complicated systems of rates and discounts for varied load factors and consumptions. Where the mill can so adjust its operations as to permit keeping off the central station peak there should be a lower rate than for peak service. Some of the power companies reporting charge only 50 per cent of the peak demand rates for off-peak service only.

We recommend that in negotiations for central station power service, and in order to obtain most favorable rates to the purchaser, it be insisted that the rate schedule be divided into demand charges and energy charges; that the demand be the average or integrated peak of 15 to 30 min. duration; that the power factor be 80 per cent, with decrease or increase in the demand to be charged for accordingly as the power factor is above or below 80 per cent; that the demand charges per kilowatt be in two or more steps; that the energy charges per kilowatt-hour be in two or more steps; that any excess demand occurring at other than the peak period of the power company's plant be charged at only one-half the demand charge normally applying for such excess if occurring on the power company's peak period. With rate schedules on the basis recommended, the mill engineer will obtain the benefits due to good operating conditions and not be obliged to pay for the poor conditions of another consumer's load.

The user of electric power is enabled to collect engineering data, such as capacity of machines, load curves, power requirements, maximum demands and power consumption, and, in addition, to provide a means of analyzing the cycles of operation throughout the plant. With such records, the central station can accurately determine the requirements of steel mills and negotiations for the sale of power are greatly facilitated.

The power requirements in steel mills range from 1000 to 10,000 kw. or more. A fair average is about 4000 kw. The load is characterized by large peaks. Where alternating-current service is used the power factor will vary from approximately 65 to 80 per cent. Large generating capacity is required to provide service of the proper regulation.

Table No. 1 has been compiled from data obtained from a number of steel mills, and shows the generating capacity actually installed, together with the connected load in motors and lighting.

APPLICATION OF CENTRAL-STATION POWER

In all large modern central stations the power is generated and transmitted as alternating current at a voltage considerably higher than is permissible for use around a plant. At the receiving end of the transmission line this power must be retransformed to at least two and generally three lower alternating-current voltages, namely: 6600 or 2200, 440 or 220, and 110; and where direct-current power is used further transforma-

tion is required from alternating current to direct current.

The 6600-volt or 2200-volt current is used for driving the synchronous motor of the motor-generator sets, the large motors driving the mills and some of the larger auxiliaries, say from 100 hp. up for the 6600-volt and 50 hp. up for the 2200-volt for driving pumps, fans, blowers, etc., in those locations where these voltages can be used without endangering life and property.

direct-current power is used, the exceptions being where variable speed and dynamic braking are required. The direct-current motors are so much better adapted for this class of service that the disadvantage of greater conversion loss is more than compensated for by their flexibility and adaptability.

The ratio of alternating current to direct current used will vary greatly in different plants, depending on so many factors that no standard can be set. In general,

Gene	TABL		ATING CAL	PACITY ACTUALL Connect	TINSTALLE ed Load—	D WITH CON	Kw. Connected	KwHrs	. Der Vear-
Total Kw. 10,400 1,650 9,500 10,650 6,450 15,400 2,000 2,200 475 250	No. Unit \$ 8 8 8 8 11 1 5 2 4 4 3 2	Largest Unit 3,500 550 2,500 2,000 2,000 2,500 400 400 250 550 225 200	No. 950 202 730 464 1,280 252 400 204 66 8	Total Hp. 49,790 6,870 26,570 20,640 37,790 9,787 1,654 11,525 1,947 4,531 1,131	Light Kw. 750 125 490 490 750 146 125 563 44 120 56	Total Kw. 44,565 6,171 23,871 18,653 34,005 8,755 1,580 10,705 1,797 4,106 1,051	per Kw. Generating 4.28 3.74 2.51 1.75 5.28 0.568 3.95 5.35 3.59 1.87 2.21 0.697	Total 27,072,000 4,325,000 38,725,000 18,950,000 73,117,000 68,000 9,970,000 9,80,000 5,422,000 1,219,000	Per Kw. Connected 607 700 1,622 1,638 558 8,350 43 931 545 1,323 1,159
2,150	4	550	398	13,117	220	11,763	5.46	7,594,000	646

For the remaining auxiliaries the alternating-current voltage is further reduced to 440 or 220 volts. Motors wound for these voltages have a wide range of application, covering almost all classes of service in the mill, especially where constant-speed characteristics are required.

For lighting 110-volt is generally used and transformed from either of the above voltages. In all of the above transformations a certain percentage of the initial purchased power is lost, the magnitude of the losses being in the order of the motor-generator sets first, the rotary converter second, and transformers third and least.

In some contracts for central-station power the power paid for is that which is delivered to the high-tension side of the transformers connected to the transmission lines, the power being measured on the low side of the transformers, the wattmeter readings on the low side being multiplied by a constant or multiplier which takes into account the transformer losses. In contracts of this class the purchaser pays for transformation losses. In other contracts the power paid for is that which is delivered on the low side of the stepdown

in those plants where power is purchased and where there are many cranes and variable speed drives direct current will probably predominate for auxiliaries about in the ratio of 60 per cent direct current to 40 per cent alternating current for voltages of 440 alternating current or less and 250 direct current.

The alternating current is suitable for driving fans, pumps, hot saws, cold saws, conveyors, straightners, drill presses and possibly some mill tables. Alternating-current motors are not favored for table drives, for the majority of them require a wound rotor type of motor, which, as a rule, is more difficult to repair than a direct-current armature, and the direct current is better adapted to heavy table work.

Direct current will be used for cranes, tables, charging storage batteries, electrolytic work and variable speed motors, especially those used for driving machine tools. The type of winding to use will depend on the nature of the load and the results sought. This subject was discussed in a paper read before this association by R. B. Treat in Milwaukee in 1912.

In general, the use of alternating-current motors is recommended where constant-speed, non-reversing

Table 2—Percentage Losses Incurred in Distributing Central Station Power from Receiving Station to Plant Feeder Station Busbars

		PEEDER ST	ATION BUSI	BARS				
Mill drives	Transformer Losses from Previous Line to 6600, previous or 2200 Volts	Transmission Losses from GALALLA H. T. Transformer	Transformer Losses 6600 or 2200 Volts to	Transformer Losses 440 Volts to	Rotary Losses	Motor-Generator	Net Power	925-11 Increase in 900-121 Initial Cost 2.8-8-8 of Power

transformers, the power company paying the losses of the first transformation, the purchaser paying for all others.

A summary of the losses is given in Table No. 1. A study of Table No. 2 would indicate that in deciding on the motor equipment that that equipment should be selected which would entail the least losses to the power delivered to the motors. If this was followed out without regard to other conditions we would select 6600 or 2200 volt apparatus; but physical and safety considerations limit the use of those voltages, and consequently only a relatively small number of the total motor equipment can use them.

Our next choice, so far as efficiency goes, would be for the 440 or 220 volt alternating-current auxiliaries. These can be used in almost all applications where conditions obtain, and the direct current where large starting torque, quick-reversing and acceleration, variable speed or dynamic braking are required.

Aluminum powder has been added to the list of British import prohibitions under a proclamation of Oct. 3. The following articles have been removed from the list of prohibited exports to all destinations, according to a cablegram to Commerce Reports from the American consul general at London dated Sept. 30: Iron and steel plates and sheets, steel flats, rounds and squares, except carbon steel for tools and steel for mining purposes. From prohibitions to all non-British destinations the following have been dropped: Steel and steel articles containing chrome, cobalt, nickel or vandium.

Structure and Properties of Steel Ingots*

Analogy Between Stearine and Steel-Crystalline Structure and Its Effects -Shrinkage and Contraction Cavities

BY A. W. AND H. BREARLEY

THEN steel, or any other crystalline substance, is cast into a mold the freezing commences from the inner surfaces, supposing the substance is quite fluid to begin with. Assuming the mold to be made from cast iron, and its cross section a square,

then freezing in any plane occurs more rapidly at each of the four corners than elsewhere; and the crystals lying in and about the corners, in consequence of the rapid cooling, are comparatively small ones. Crystals grow also the sides of the mold, but as their growth sideways is hindered by the ad-jacent crystals, and their growth forward into the fluid mass is less strained, they become long and narrow in shape. boundary to the cooling effect of each side of the mold is visible on a pol-

ished and etched specimen, or on a fractured surface,

as junction lines lying diagonally on the square.

In the same way from the bottom of the mold, which is assumed to be flat, crystals grow also upwards until they meet those crystals growing from the sides of the lower part of the mold. In the same way the cooling effect of the atmosphere on the free upper surface would cause crystals of the same narrow kind to grow downwards until they also terminated on the surfaces of a four-sided pyramid, assuming, of course, that the fluid material froze quickly, and was not disturbed at the upper end by shrinkage cavities or segregation effects. The influence

of segregate plus contraction cavities would account for a great deal of the observed weakness along the diagonal planes, and it not possible, apart from this influence, to determine how much of the observed weakness is due only to the crystalline arrange-

INGOTS CAST WITH MOLTEN STEARINE

general observations can readily be verified and illustrated by means of ingots cast with molten stearine. As we have formed a very high opinion of the use of stearine for this and other similar purposes it is desirable at this stage to refer to the very natural prejudice against applying to steel ingots ons drawn from the behavior of stearine. To make experiments with steel is no doubt the most reliable way of learning about the changes which occur during the casting and solidifying of steel ingots; but it entails a costly plant. There is also no

*First portion of an abstract of a paper presented at the autumn meet-ing of the Iron and Steel Institute, in London, Sept. 22, 1916.

method of determining the temperature of molten steel with satisfying accuracy.

With a few pounds of stearine, a pan of water, a beaker, a bunsen burner, a few tin molds, and considerable patience, a great number of observations

can be made to illustrate, extend, and also, in some respect, to correct prevailing notions about steel in-To increase respect for observations along these lines and cautious interpretations thereof I need refer only to the very striking operation of re moving the base pyramid.

Those engaged in making ingots for the manufacture of ordnance are aware that for some was usual years it many works to cut discs from the ends of ingots or billets and after polishing to etch them. On many

such discs the etching revealed a ring of white spots which were really ferrite areas segregated about slag globules. The nearer the base the disc was cut the larger the ring of white spots. Though the white ring appeared frequently during the few years such observations were being made, no steelmaker, within our experience, would admit that a well-formed cone, such could be dislodged from a stearine ingot, could ever exist in a steel ingot. Eventually, however, a steel ingot weighing about 8 cwt. was cast in such a way that it was held fast at each extreme end. When cooled under such conditions the ingot naturally

cracked across the weakest part, and produced the cleanly arated cone reproduced in Fig. 2.

In a round ingot the crystals growing from the bottom of the mold are formed into a cone, and in an octagon ingot they form an In eight-sided pyramid. case the base pyramid is longer or shorter, depending on the cooling effect of the bottom in relation to the cooling effect of the

THE GROWTH OF CRYSTALS

The growth of the elongated crystals originating at the sur-face of an ingot mold depends on circumstances, which appear to be somewhat contradictory, i.e., they are favored sometimes by slow cooling and sometimes by rapid cooling. So long as the fluid in the interior of the partly solidified ingot remains quite liquid, the crystals already grow quite ing from the sides of the mold increase in length as the temperature of the liquid about their extreme ends falls to freezing point. The act of freezing liberates heat, which is either stored up in the fluid or dissipated via the solid crystals, through the sides of the ingot mold. If the crystals are

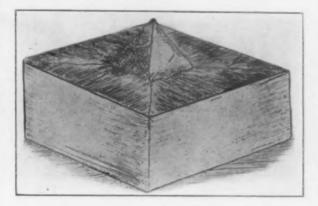


Fig. 1-Partly Exposed Base Pyramid of a Stearine Ingot

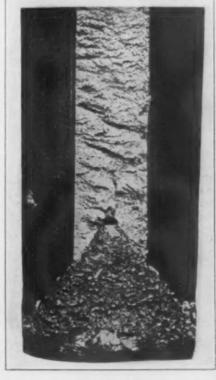


Fig. 2—Exposed Pyramid in the Base of a

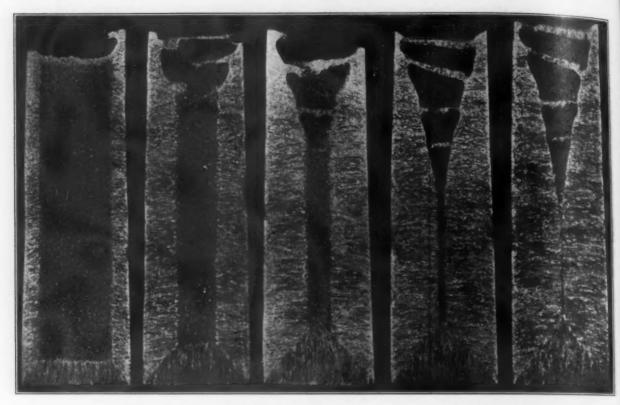


Fig. 4-The Symmetrical Freezing of Steel Ingots Illustrated by Stearine Ingots

bad conductors of heat the cooling is necessarily slow, whatever the properties of the ingot mold may be, and the fluid in the center of the ingot remains clear almost to the last drop, while needle-like crystals extend to the center.

But if the crystals themselves are good conductors of heat, then the heat liberated as they form and also the heat from the fluid interior is rapidly dissipated through them. In this way the temperature of a large volume of fluid may reach its freezing point in many places simultaneously, before the crystals growing from the sides can extend to the center, and thus the interior of an ingot would consist of crystals which had grown from independent centers and were developed in haphazard ways in all directions.

Of crystallizable substances, therefore, which are

clearly liquid when cast, those that are very poor conductors of heat will form crystals of the same kind from the surface inwards if allowed to cool undisturbed. But steel, on the other hand, which is a good conductor of heat, will form crystals of the same kind from the surface to the center of the ingot, only if the cooling takes place very quickly or very slowly. In the former case the crystals grow into the clear liquid and extend themselves rapidly as its temperature falls to freezing point. In the latter case, however, the cooling is so slow that, owing to its high thermal conductivity, the temperature of the fluid mass becomes practically uniform throughout, and then a crystal is as likely to start growing in one place as in another, the result being irregular and approximately equiaxial crystals.

Elongated crystals occur most

Elongated crystals occur most frequently in steel cast in chill molds of narrow section, and the equiaxial crystals in steel cast in dry sand molds. Obviously there exists a great number of instances where both kinds of crystals occur in the same ingot, the exterior crystals being needleshaped while the interior ones are equiaxial.

SHRINKAGE AND CONTRACTION CAVITIES

If we imagine an ingot mold filled with fluid material that could be cooled with perfect uniformity down to its freezing point, we should find that the level of the fluid would gradually sink as the fluid cooled and shrank. If at this point the fluid were to solidify instantaneously without change of volume we should have a solid ingot. But neither stearine nor steel behave in this manner, and cavities due both to shrinkage of the fluid and contraction of the solid materials exert a great influence on the economic production of ingots, and have to be reckoned with.

That the freezing of an ingot takes place by a continuous thickening of the solid envelope in planes parallel to the cooling surfaces of the solid is not unanimously admitted. The illustration given in Fig. 3

has been reproduced and approved as a representation of the freezing of steel ingots. It is, however, so far as the authors' observations go, a misleading representation of steel ingots and an inaccurate representation of the freezing of any crystalline substance, metallic or otherwise.

stance, metallic or otherwise.

If a series of stearine ingots are cast simultaneously from, say, 65 deg. C. in square molds, in all respects identical and widely spaced apart so that each cools freely, then on piercing the top and inverting one of them after 15 minutes and a further one after each additional 15 minutes, we are left with a series of shells of gradually increasing thickness, but in each case the shape of the cavity out of which the fluid wax was emptied corresponds to that made by the inner walls of the mold.

The same fact can be demonstrated in a more elegant manner by gradually planing down a single ingot parallel to one of its faces. After a few strokes with the plane the sectioned surface exhibits an envelope lying around it. The thickness of the envelope increases as the planing proceeds just as it did when the ingot was freezing, but it remains quite

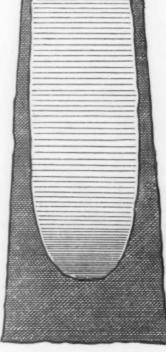


Fig. 3-An Accepted Representation of the Freezing of Steel Ingots

symmetrical in all parts, as may be seen from the series of photographs reproduced in Fig. 4. Also it thickens parallel to the cooling surfaces and forms where the bottom and sides intersect a sharp corner, and not the conventional curve seen in Fig. 3.

That steel behaves in a precisely similar manner is known to those furnacemen who have opportunities now and again of seeing ingots broken up that have been apset or otherwise accidentally and completely bled. Photographs are shown in Fig. 5 representing a crucible steel ingot that was intentionally inverted, and a much larger ingot from a series prepared by Talbot. When freezing takes place in the interior of the fluid mass, and not merely by direct thickening of the walls, the above conditions do not apply.

INGOTS CAST IN STRAIGHT MOLD

An interesting feature is exhibited by many ingots cast in straight-sided molds as distinct from taper molds used with either the narrow or wide end up.

When sufficiently removed from the cooling influence of the closed bottom and the open top of an ingot mold the freezing of any horizontal section of the fluid ingot may be regarded as due to loss of heat through the sides of the mold. When the mold has the same cross-sectional dimensions from top to bottom the crystals growing from the sides in any one plane are as likely to meet in the center as soon as those growing in any other plane.

In both commercial stearine wax and in steel a plane of the material may be all but rigid, quite too rigid at the center to flow downwards, but requiring still to contract over its entire area. The material next the ingot mold is coldest and most rigid, and if the unavoidable contraction cannot pull the flat outer surfaces inwards, the assumed plane must split at the center where the material, all but set, offers little resistance.

The result is a small central cavity with no material above it fluid enough to flow downwards, and the net effect in an ingot of this kind is a number of cavities roughly spherical in shape, lying in the axis of the ingot. For shrinkage or contraction cavities of this kind an increased length or breadth of feeder head is a doubtful remedy.

An ingot which has quite set and is still hot contracts in volume on cooling, but as the outer surface of the ingot is hard, and will not yield much, the stress of contraction will be satisfied, wholly or partly, by the formation of internal cracks or cavities in those positions where the resistance is least. In a solid ingot there are certain planes of weakness, due to the arrangement of crystals, which converge from the corners of the mold toward the axis of the ingot. An ingot is therefore easily split along its axis by tensional forces acting at right angles to its length; and it is further induced to yield to such forces by the fact that the ingot is hotter in the center and weaker also on that account. This explanation accounts equally well for axial cavities and cracks formed just before or just after complete solidification.

From the moment that a solid envelope is formed about the liquid the crystals growing from the sides of the mold form planes of weakness where they meet each other obliquely, and it is along these planes that contraction cavities are located. They are easily seen when a stearine ingot, cast under favorable conditions, is split diagonally along its length, as reproduced in Fig. 6, after planing an ingot down until a diagonal section is exposed. These cavities all converge to the center of the ingot, and appear to depend on and originate from an axial cavity. But in addition to cavities that are obvious to the naked eye it is not unusual in steel ingots to find cracks running between the crystals at right angles to the surfaces of the ingot mold.

Radial cracks may occur in steel ingots which do not exhibit elongated crystals on a fractured surface. When a disc cut from a large steel ingot weighing 40 or 60 tons, or from a circular billet which has been forged from such an ingot, is polished and etched with a very dilute solution of nitric acid in alcohol, the intercrystalline cracks are located by the evolution from them of small gaseous bubbles. That the gaseous bub-

bles may escape more easily it is advisable to arrange the disc with the polished face in a vertical position and wash it over by means of a broad camel-hair brush with the etching fluid; small strings of bubbles then run with the solution down the face of the disc from one or two or maybe a score or more cracks. The objectionable features of contraction cracks are emphasized by segregation or slag occlusions, and these as well as the amount of hot work done in the forging determine whether or not the crack will weld up. Fig. 7 represents the kind of radial crack we are speaking of as it existed in a 30-in. billet. The light-colored spot is a transverse section of a miniature ghost, and when these occur in groups the cracks will generally pass from one to the other, as in the other photomicrograph, Fig. 8, as the small slag globules or streaks of slag, around which the ghost forms, have already broken the continuity of the metal.

If the material in which the cracks appear is not weldable, then it is also not forgeable, and will crumble under the hammer. This explains why some alloy steel ingots may not be forged, whereas others of the same composition, but melted and cast under different conditions, forge fairly well. The number and magnitude of the cracks would obviously be increased if the steel had air-hardening properties.

CASTING TEMPERATURES AND SCORCHING

When a crucible steel ingot breaks with a needlelike fracture it is said to be "scorched," and scorching is said to be due to the molten steel having "had too much fire." A furnaceman does not generally commit himself by saying whether the steel has been for too



Fig. 5—Appearance of a Large Steel Ingot After Bleeding and a Crucible Steel Ingot Intentionally Inverted

long a time in the furnace or at too high a temperature. He may not know; but he does know a scorched ingot can be broken across with remarkable ease, and that he will very likely get into trouble if he makes many such ingots.

Scorched ingots are objectionable only on account of their fragility, due to arrangement of the crystals in definite directions, and the extended contraction cavities which may arise. This is, of course, a serious objection, because unless the scorched ingot, after reheating, is very carefully, and, to begin with, very gently forged the weakness between the well-developed crystals will cause cracks to form at the corners of the forged bar.

The internal structure of a "cold cast" ingot is unlike that of a hot cast ingot, because in the former casethe centers of crystallization are dispersed throughout the entire ingot instead of being confined to the inner surfaces of the mold or the solid metal envelope already formed from it. The crystals therefore do not grow in planes but in all directions, and form spherical clusters floating in the fluid like seed-pods of a dandelion floating in still air. The clusters of solid crystals are heavier than the fluid steel and tend to sink to the bottom of the mold.

To express in definite figures the influence of varied casting temperature on the mechanical properties of steel would involve an enormous amount of labor and require great experimental skill. It would, for example, not suffice to machine test pieces out of an ingot, because the defects to be looked for would sometimes be in the test piece and at other times not; and even if it were practicable to machine always a test piece containing a typical defect it would be quite impossible to arrange for the defect to occupy the same relative position in every test piece, and therefore the tensile properties of the test pieces would vary among themselves without indicating any corresponding variation in the ingots from which they had been prepared.

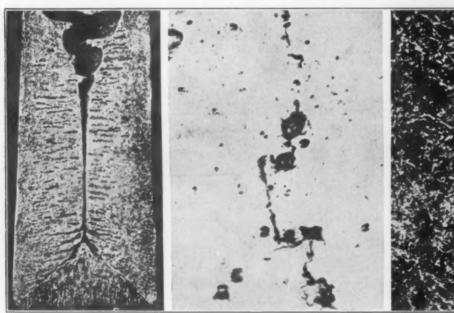
The least objectionable form of test piece is the ingot itself. But as commercial ingots are not amenable to the requirements of testing methods and machines, and as, further, there is no handy means whereby the casting temperature of steel can be accurately measured, we are obliged to content ourselves with

ingots cast respectively at 56 and 54 deg. C., the latter being alost twice as strong, and this is confirmed by the appearance of the fractures, which show a marked difference within this short range of casting temperature. The ingots cast at 54 deg. C. have a granular or finely crystalline structure, while those cast at 56 deg. C. and over show scorch. This observation is quite in line with the behavior of small steel ingots, both as regards appearance of fractured surfaces and mechanical strength.

Table of Net Breaking Loads on Stearine Ingols Cast at
Different Temperatures

	2011	0.0100 2	curber as	MALCO.		
Casting	-	Brea	king Lo	ad in Gr	ammes	
Temperature. Degrees C.	1	2	3	4	5	Average
80	1618			****	****	****
75	1671	* * * *		****		
70	1551			****		
65	1220	2222		****	****	****
64	1292	1155	1208	* * * *	***	1218
62	1048	1009	2222			1029
60	1224	1274	1168		****	1222
58	982	1009	1088	****	****	1026
56	1459	1155	1605	1830		1512
54	2783	2995	2783	3193	3127	2938

	Gram.
One minute after reaching 54 deg. C	3250
Two minutes after reaching 54 deg. C	3224
Three minutes after reaching 54 deg. C	. 3021
Four minutes after reaching 54 deg. C	2995
Five minutes after reaching 54 deg. C	. 3101
Six minutes after reaching 54 deg. C	. 2929



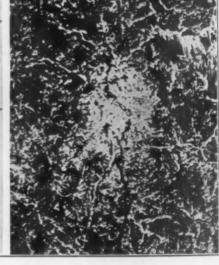


Fig. 6—Diagonal Contraction Cavities in a Stearine Ingot

Fig. 8—Easy Passage of Radial Crack Between Slag Inclusions

Fig. 7—Radial Crack in a 30-Ton Steel Ingot

general statements to the effect that the casting temperature of steel may be too high or too low to produce the best results. When it is remembered that the correct, i.e., the best casting temperature, differs from one material to another, and for the same material according to the weight and dimensions of the ingots, to say nothing of foundry castings, there appears to be ample room for the exercise of the art as distinguished from the science of steel making.

STEEL AND STEARINE TEMPERATURES CONTRASTED

But in making wax ingots the variable conditions are controllable with that degree of accuracy which yields confirmatory results from duplicated tests, and as the behavior of stearine wax in so many respects is comparable to that of steel it may be possible by its aid to confirm the general statements alluded to in the preceding paragraph, and also, by analogies carefully drawn, to add something to it.

drawn, to add something to it.

[The author describes his ingenious method and apparatus by which he made stearine ingots at definite temperatures and tested their strength. His comments and table of results follow.]

The most noticeable feature in this series of results is the great increase in strength between those

The increase in strength when the casting temperature reaches 65 deg. C. is also notable and not especially difficult to understand. It is to be expected that, all other conditions being equal, a rise in the casting temperature alone would cause the ingots to become gradually weaker, but a rise in casting temperature disturbs the other conditions, and more especially the rate of cooling, so that an ingot cast with wax at 58 deg. C. into a thin mold might at once have a solid envelope formed around it by the cooling action of the mold; whereas when cast from a higher temperature the heat lost in cooling the mold might depress the temperature of the fluid wax to 58 deg. C. without causing a solid envelope to form around it. The rate of cooling in the two cases would then vary, and the latter would be more or less disposed to form the stronger equiaxial crystals depending on the thermal conductivity, specific heat and mass of the ingot mold, and on the relative thermal conductivity of the fluid and solid ingot material. It is therefore likely that at some temperature well above the freezing temperature a wax ingot or a steel casting would become stronger, but the rise in strength would not occur at the same temperature of course except under identical experimental conditions.

(To be Continued)

IRON CARWHEEL MAKERS MEET

Manufacturers Hold Annual Meeting-Interesting Address by President Lyndon

The Association of Manufacturers of Chilled Car-wheels held its annual meeting in New York City, Oct. Following are extracts from the address of the president, George W. Lyndon:

President's Address

"The work of our association the past year has been based upon the recommendations made to the Master Carbuilders' Wheel Committee during 1914, at which time we not only outlined a plan of procedure for the improvement of the chilled iron carwheel by which the safety element stood out prominently, but accompanied our recommendation with full data pointing out the weaknesses of the present Master Carbuilders' standards and gave our reasons for recommended changes based upon the knowledge acquired from service records and the lifelong experience of the manufacture and service of the chilled iron wheel. Our recommendations were substantially as follows:

WHEEL WEIGHTS SHOULD BE INCREASED

- An increase in the weights of the 625 and 725-lb.
- 2. An 850-lb, wheel for cars of 140,000 lb. capacity.
 3. A flange for the 850-lb, wheel for use under the 70-ton cars, with as much of an increase as would be acceptable to the American Railway Engineering Association.

"Since our organization in the year 1909, we have steadfastly maintained that the varied service in the 60,000-lb. class of cars made it imperative that the weight of the wheel should either be increased to meet the maximum conditions of service or that we should have two standards in this class.

"The variation in service arises from the variations in the light weight of the car in the 60,000-lb. capacity class, and as the standard of operation is to brake the cars 60 per cent of their light weight, it must follow that any class of cars in which there is 100 per cent variation in light weight (which is common in the 60,000-lb. class) cannot with safety carry the same weight of wheel, and this is what the manufacturers have been required to do.

"The standard wheel specified for the 60,000-lb. class weighs 625 lb. and the light weights of the cars vary from 20,000 to 53,000 lb.

PURELY FROM STANDPOINT OF SAFETY

"Our association recommended that the weight of the wheel be increased to 675 lb., which would provide a standard wheel that would meet the maximum conditions of service as to load and brake, and in asking for an increase in weight of the two standards 625 and 725 M. C. B. wheels we were not actuated by commercial considerations, but purely from the standpoint of

"It is estimated that there are 2,500,000 chilled iron wheel renewals annually, and if the weights should be increased 50 lb. each the additional metal to be purchased would approximate 62,500 tons, providing all the renewals required an increase, which is by no means the case, because many of the prominent railroads in the country, representing over a fourth of all the cars in use, are already introducing advanced standards and are using wheels much heavier than the present

Master Carbuilders' standards.
"The heaviest 725-lb. M. C. B. standard chilled iron wheel for 50-ton cars is lighter than the rolled steel wheel, and there is no good reason why the chilled iron wheel should be so limited in weight, particularly when the increase involves the nominal expenditure of \$10 per ton, which is the difference between the scrap value of the old wheel as accepted in part payment for the The reduction in accident hazards would more than absorb the increased expense due to the nominal increase in weight.

INCREASE IN FLANGE AT GAGING POINT

"Ever since the introduction of the 50-ton car, our

association has recommended an increase in the metal of the flange at the gaging point. A committee of the American Railway Engineering Association appointed for the purpose has reported that the manufacturers could increase this flange width 3/16 in. without any

change in the present flange ways of track.
"The Master Carbuilders' Wheel Committee has re ported in convention 'that there be no changes in the dimensions and contour of flanges of carwheels as adopted in the year 1909.' The flange adopted in 1909 was an improvement over the M. C. B. design, and through the recommendation of our association we succeeded in reducing its height from 11/2 in. to 1 in., which gave it greater strength, and we know that we can make improvements, and it needs no argument further prove that a stronger flange is required for the 70-ton cars than for the 30-ton cars.

ILLINOIS UNIVERSITY TO INVESTIGATE STRESSES

"Our association has made a very satisfactory arrangement with the University of Illinois through Dean F. N. Goss, in which it is agreed, that the University Experiment Station will undertake an investigation concerning the stresses and behavior of chilled iron car wheels. In submitting a draft of this arrangement to the president of the University of Illinois, Dean Goss made the following statement:

Progress in the art of railroading is continually developing new questions affecting the weight and contour of chilled iron carwheels. The importance of securing proper design and proper methods of manufacture for such wheels may be judged by the fact that there are now in operation in the country approximately 20,000,000 freight carwheels, and the demand for renewals alone involves the manufacture of 2,500,000 chilled iron carwheels per year.

With these facts in mind, the Association of Manufac-turers of Chilled Iron Wheels has agreed to co-operate with the Engineering Experiment Station in a study of the questions fundamental to the design of such wheel. The co-operation proposed guarantees to the station the strongest possible assistance in the development of an investigation of great importance to the public weal.

"All of the work of our association is constructive and our recommendations are based upon solid grounds which must receive favorable consideration, and while we have not as yet secured all the improvements outlined, we feel sure that a close analysis of our recommendations will demonstrate the reasonableness of our

"The chilled iron wheel remains in the forefront, not only in this country but in Europe, where the old European standards are seriously menaced. No other type of wheel has ever made serious inroads on the chilled iron wheel and never will, providing we are all alive to the increased demands of service, and for two-thirds of a century the chilled iron carwheel has remained the standard for the nation's commerce."

Officers Elected

The officers elected for the ensuing year are the following: George W. Lyndon, president-treasurer; E. F. Carry and J. A. Kilpatrick, vice-presidents; George F. Griffin, secretary; F. K. Vial, consulting engineer. The board of directors is as follows: E. F. Carry, president Haskell & Barker Car Company; J. A. Kilpatrick, president Albany Carwheel Company; W. S. Atwood, chief engineer, Canadian Car & Foundry Company; Charles A. Lindstrom, assistant to president Central Carwheel Company; F. K. Vial, chief engineer Griffin Wheel Company; A. G. Wellington, president Maryland Carwheel Works; W. C. Arthurs, president Mount Vernon Car Mfg. Company; J. D. Rhodes, president National Carwheel Company; F. B. Cooley, president dent New York Carwheel Company; A. J. Miller, general manager Ramapo Foundry & Wheel Works, and William F. Cutler, vice-president Southern Wheel Com-

Contracts for furnishing 6-in. projectiles for the United States Navy, under bids opened Aug. 23, have been awarded to the Cleveland Crane & Engineering Company, Cleveland, and for furnishing 1-lb. common projectiles to the Edwards Valve & Mfg. Company, Chicago.

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An Armor-Plate Contract Problem

The Navy Department announces that it will receive proposals Nov. 1 for furnishing 45,583 tons of armor plate for battleships Nos. 45, 46, 47 and 48 and battle cruisers Nos. 1, 2, 3 and 4, authorized by the naval appropriation act of Aug. 29, 1916. This armor plate is divided into five classes, namely, A-1, A-2 (turret), B, C-1 and C-2. Manufacturers submitting proposals are required to make an agreement to enter into contracts within seven days after the receipt of notice of acceptance of their bids and to give bonds in a penal sum equal to 10 per cent of the total amount of the contract for the faithful performance thereof.

The amount of armor plate called for by the department's advertisement is the largest for which bids have been solicited at one time in the history of the United States Navy. It is estimated that it will keep the three existing armor-plate plants busy for a year and a half, a fact which is the basis for no little speculation among naval experts as to the policy that will be pursued by the department in awarding contracts on the basis of the bids that will be received. Throughout the discussion of the projected Government armor-plate factory the Secretary of the Navy has criticised several of his predecessors in the harshest terms for accepting practically identical bids from the several armorplate manufacturing concerns and dividing the contracts among them. A situation has now developed that will probably give him an opportunity of dealing with a similar problem under circumstances that will render it especially difficult for him to depart from the policy pursued by those of his predecessors whom he has so severely attacked.

As the result of the threshing out of the question of factory costs and reasonable profit on armor plate during the recent Government factory investigation, both the officials of the Naval Ordnance Bureau and the managers of the private plants are in position to estimate with a considerable degree of accuracy the cost of manufacturing armor plate on any given basis of raw-material cost. It is therefore to be expected that even without the slightest collusion the armor-plate manufacturers will submit bids so nearly identical that the difference will be negligible. Assuming, however, that one bid should be lower than the others by a margin sufficient to command consideration, will the Secretary of the Navy decide that it is for the best interests of the Government to place the entire contract with a single manufacturer, who would require from three to four years for deliveries, or will he do exactly what several of his predecessors, against whom he has inveighed so bitterly, found it for the best interests of the Government to do, namely, to call in representatives of all the bidders and divide the contract with approximate equality on the basis of the lowest bid?

In assailing the course pursued by his predecessors in similar cases, Secretary Daniels was free to heap his criticisms without stint, as there was nothing before him. To-day, however, he is confronted by a concrete proposition, and the manner in which he meets it will be awaited with a very lively interest in many quarters.

The importance to the Government of private armor-plate plants in any emergency that might arise is clearly demonstrated by the necessities of the Navy Department at this time. The largest Government armor-plate factory contemplated at any time has had a capacity limited to 20,000 tons per annum, so that should the private factories be closed down as the result of the establishment of a Government plant it would require more than two years and three months to provide the armor which the Government now wishes to have produced at the earliest possible moment. Practical armor-plate makers are convinced that such a factory as can be built within the next two or three years for \$11,-000,000, the limit of cost fixed by Congress, would not be equipped for an output exceeding 12,000 tons per annum, and it is an open question as to how many years would elapse before such an institution could be brought up to its maximum producing capacity.

Outrunning Our Labor Supply

Overprosperity is leading to embarrassments and perplexities which are peculiarly of its own generation. The root of the troubles now annoying the iron trade is the scarcity of labor. At the very time when immigration from Europe is checked, and the human stream is more inclined to flow in that direction than this, our activities are stimulated by a world-wide demand for our products, and we need, say, three men where two were ample before. Old works are being enlarged and

new ones built, mines are being developed on a larger scale, transportation facilities are being expanded as rapidly as conditions will permit, additional communities are being transformed from rural to urban conditions, with a steady increase in all the demands that accompany vigorous growth, and constantly on all sides the complaint is heard of scarcity of labor. This is not because we are actually short of men, as the number of workmen in the country, through natural increase, must be greater than a year or two years ago, despite the return of European reserves to army service, but it is because our industrial expansion is proceeding at a greater rate than our human labor supply increases.

We complain of shortage of cars, but if cars were abundant there would still be the complaint of lack of men to load and unload them. We are suffering from a scarcity of coke, but this is not for lack of coking coal or of coke ovens, but because the supply of men is not great enough to enable all the coke to be made that we have facilities to produce. Thus one occupation after another may be taken up, and all will tell the same story—inability to attain full growth or development because of the scarcity of labor.

For this state of affairs there appears to be no immediate remedy. Our supply of men such as we need cannot be quickly increased as long as European nations are drawing every available subject into their armies. It is a condition which will have to be borne philosophically. The employer who chooses to do so, can, of course, win men from other employers by paying higher wages. But there is a limit to this, as eventually the cost of production eats up all profits. We need to slacken our pace and lessen our efforts to grasp more and more of the business coming in sight, recognizing that even prosperity may have its bounds.

Results from the Trade Balance

Of the past 22 months no less than ten have established successive new high records for the favorable balance in our foreign trade in merchandise. The \$131,000,000 favorable balance in December, 1914, was regarded as altogether phenomenal, but last month's fresh record was \$348,719,353, far surpassing the remarkable record of \$310,531,-289 made in the preceding month. The new record was made through an increase of \$3,000,000 in exports and a decrease of \$35,000,000 in imports.

While the September exports were the largest on record, the September imports were the smallest since October, 1915, while they were smaller than in three months in the early part of 1914, before the war. The August imports were smaller than in four of the months earlier in the year. The record high imports fell as long ago as last June. Hence, it is clear that in recent months our imports of merchandise have displayed no tendency to increase, whereas in the past twelvemonth there have been seven months in which exports broke all records.

Thus the prospect is that however remarkable have been the results of our foreign trade thus far in the war, the prospect promises still more stupendous favorable balances and the results in the future must prove of literally overpowering importance.

Up to date the settlement of these balances has been readily accomplished. Those who have bought from us have indeed even anticipated the balances. As between nation and nation they have really paid in advance to an extent, and it is well known that individuals and corporations in the United States have in many cases received advance payment in part when contracts for the supply of goods have been accepted. As a rule, furthermore, they have been paid in full for delivery f. a. s., so that days or weeks elapsed before the merchandise was entered for the familiar export statistics published monthly by the Government. A brief summary of what has occurred may be of interest.

It is understood, of course, that the apparent balance in the merchandise trade is not the real balance by which the country grows richer or poorer, as there are various items in what is for convenience called the unseen balance, including freights paid to foreign vessel owners on imports (which are valued at the foreign port for statistical purposes), interest and dividends paid on American securities held abroad, expenditures abroad of American tourists, etc. Various attempts have been made to estimate the unseen balance, but it is perfectly obvious that no estimate could be made in the premises that could be depended upon as being within 10 per cent, or possibly 25 per cent, of the fact, and there is always the suspicion that the estimator is endeavoring to arrive at a total which will fit with the facts of the merchandise balance, in which case the estimate would be useless. It is more pertinent to observe that from 1898, the first year in which there was a really large balance, to 1913, the year before the war, the average merchandise balance was \$505,-000,000 a year, and the balance was a trifle smaller in the second eight years than in the first. In the circumstances the unseen balance made up of the common items cannot be regarded as liquidating year by year the merchandising balance, because this unseen balance must undoubtedly have increased very considerably.

The only explanation is that there was a large movement of American securities out of the country in recent years. At the opening of the war all that was known was that there was a large volume abroad and there must have been a time when they got there. Lately some information as to the volume existing abroad has been gathered, as will be considered later. Since the war started the unseen balance has probably been less, so that half a billion a year may be taken as unlikely to disturb the calculation sensibly. In the calendar year 1914 the merchandise balance was only \$324,348,049, so that we had become a debtor, and the proper comparison is made by starting with Jan. 1, 1914. The accumulated merchandise balance from that date to Oct. 1, 1916, is \$4,211,000,000.

To ascertain the amount chargeable against this sum various items must be summed. There is the gold movement, net exports of \$165,228,415 in 1914 and heavy imports since then. There is the unseen balance, comprising various items, to be taken at \$500,000,000 a year. The return of American railroad securities, according to Mr. Loree's figures, involved a reduction in face value held abroad from \$2,704,402,364 on Jan. 31, 1915, to \$1,415,628,563 on July 31, 1916. Allowance must be made for the

difference between face value and market value, for the movement in August and September, and for securities other than railroad, which some authorities have guessed at one-fourth in addition. Finally there must be considered the flotation of foreign loans in the United States. These items may be taken as follows:

Unseen	balance			0 0 0	 	\$1,375,000,000
						543,758,263
Return	of securi	ties	****		 0 6	1,500,000,000
Foreign	securitie	es bo	ought		 * *	1,600,000,000
Total,	about .				 	\$5,000,000,000

It appears thus that up to Oct. 1 the merchandise trade balance has been settled and with \$800,000,000 to spare. Of course, the figures are not precise, but in the circumstances it is reasonable to assume that the general showing is substantially accurate.

As to the future, there was left on July 31 American railroad securities held abroad to the extent of \$1,415,000,000 face value or \$1,111,000,000 market value, and assuming a return during August and September at the rate obtaining in the six months previous, there would be left \$900,000,000 market value on Oct. 1, while eight and one-half months more at the same rate would complete the return. Including industrial and other securities there might be from a billion to a billion and a half. These will not all come back in any event, however, as a start has already been made at using them as collateral for loans made in the United States.

Not much more gold will come to the United States, as compared with our rate of import of \$35,000,000 a month in 1915, or the rate of \$32,000,000 a month thus far this year. The London Statist, which virtually speaks for the Bank of England, has just made the startling prediction that if the war lasts through next year England cannot maintain specie payments.

From the viewpoint that the merchandise trade balance has been increasing steadily and rapidly and stood at \$348,719,353 for September, while imports show a decreasing rather than an increasing tendency, the volume of securities still to be returned is relatively small, and no very large amount of gold can be furnished, it is evident that there are to be enormous flotations of foreign loans in the United States. When the representatives of the British government came to American bankers last year with a proposition for a loan of one billion dollars the bankers were aghast and when a compromise was made on half a billion they probably felt that the British were really getting about what they had expected. In future such sums will appear relatively small.

It is rather easy to surmise roughly what is about to occur with the United States as a nation. We can consider our exporting of merchandise at a great profit, buying back our securities and taking part in foreign loans. But the real question as to our future industrially and financially is not answered, for we are thinking in terms of a nation, whereas our industrial activity is a question of individuals. The wealth that comes to the country is not, in the act, distributed. The matter of distribution is a wholly different question. We have had "undigested securities" and now we may have undigested wealth. There has been fear that after the

war the foreign countries would begin getting the wealth back from us, but the individuals and corporations then holding such a large part of the accumulation will have something to say about that. It is a well-known fact that many concerns which have already made large profits find it a physical impossibility to spend on improvements and extensions, as rapidly as they would like, the money they have already made, and still the profits are coming in at an increasing rate. To make a rough draft of the country's accumulating wealth is relatively easy, compared with the problem of the effect the wealth will have upon our financial, our industrial and even our social life.

CORRESPONDENCE

Sales Contracts That Are Binding

To the Editor: Fortified in whatever position they might care to take, by the flood of orders placed at their own terms, sellers of steel have naturally used the opportunity to put a literal construction on agreements to buy definite quantities of material at definite prices, an interpretation heretofore regularly contended for but rarely insisted upon. The long acquiescence of the mills in the treatment of so-called contracts as options of the buyer is well known. The buyer was to all intents and purposes invited to protect himself for his maximum needs against any advance in price, with the tacit understanding that he need take out only as much as he felt like and in a declining market that he settle at the best price obtainable below his contract figure.

It is not a criticism of the buyer that he has used the implied liberty of his contract to his greatest advantage, though the mills apparently have not failed to keep record of those who habitually and conspicuously fail to take out their contract tonnage. In fact, a large number of buyers have not hesitated to condemn this loose manner of doing business. Not only have they found that the mills, discounting the value of their contracts, are prone to oversell, with resultant delays in delivery in times of good business, but they have seen the injustice of the consumer who makes a wild guess as to his requirements or the course of the market, being as well protected as the good buyer who carefully and correctly analyzes his purchases. Steel contracts, as they have been regarded, reduce purchasing departments to a common level. Binding contracts will put a premium upon intelligent buying.

It is not surprising, therefore, that the recent action of the National Association of Sheet and Tin Plate Manufacturers, in offering to customers a mutually binding form of contract which contemplates a sale and purchase not subject to cancellation, postponement or price revision because of market conditions, has met a favorable response from many buyers. But criticism was not lacking from others who consider that such a contract is put forward by sellers because present conditions give them an unusual advantage.

Admitting that circumstances now favor the manufacturers in the matter of contract terms, it must also be pointed out that their purchases of raw materials have been, under the circumstances of the past year, even more beset with uncertainty than those of finished material. It should be realized that the maker of sheets, tin plate, plate and bar steel, copper and brass, is under the necessity of protecting his sales by outright purchases of pig iron, raw steel, copper, spelter or other raw materials, entering into firm contracts to take the materials bought, yet at the same time is forced to accept the usual list of clauses regarding unavoidable delays. Without a guarantee that the purchases of his product would be followed by the positive taking out of the material at the price named, the manufacturer would find himself facing impossible risk.

These general circumstances, together with the large

accumulations of unfilled orders which are subject to all the uncertainties of production, make promises of definite deliveries impossible; yet to preserve the mutually binding character of their sales agreements some companies are giving to the customer the right to cancel if his order is not filled in four months. Mills which are selling with absolutely no promise of delivery, but are trying to serve customers at much lower prices than they are able easily to get for export, may fairly claim that they too are not only making a maximum effort but a real sacrifice to care for their trade. Without the guarantee that the buyer of steel products will take the material purchased, even though he has no assurance as to when it will be delivered, the manufacturer working with high-priced raw materials purchased against these orders would face the possibility of a staggering loss in the event of a sharp break in the market.

If the binding agreement be continued, in periods of poor as well as good business, and is made effective without exception, the wise purchaser will yet find that it has advantages far outweighing the liberty of a loose contract.

STEEL.

American Steel Trade with Europe

To the Editor: It has occurred to the writer lately that American manufacturers do not entirely appreciate some of the facts connected with selling methods in Europe. American methods are undoubtedly more efficient in that there is less time lost in the actual negotiations between seller and customer, due to fewer formalities and fewer seemingly needless courtesies.

However, these conventions and ceremonies are based on very old traditions, and cannot be overridden with scant respect without offending the foreign customer. This is especially the case in Russia, where diplomacy enters into trade relations almost as much as into international affairs. Supreme patience and never failing politeness are essential to the would-be seller in Russia. Should an energetic American salesman attempt to overwhelm a Russian customer with vigorous arguments bristling with his best talking points, as he is accustomed to doing at home, he would stand a very small chance of success as against a polite and diplomatic French competitor.

The field now opening in Russia is so enormous that it is worthy of the best talent and ability that Americans can possibly find. Knowledge of the Russian language is not essential, but the ability to talk French will be found to be of very material assistance, as all well educated Russians speak French and generally one or two other languages. It will be a revelation to many people to see the extent to which Russia has been benefited by this war, and the building programs now under consideration are such as even the United States has seldom seen. Russia, more than any of the other Allied countries, will merit the greatest efforts of American manufacturers to export steel to her, and if properly approached will be found to be an exceedingly profitable customer.

In France the greatest difficulty to be overcome is redulity. This is unfortunately due to the many incredulity. cases in the past where American "bluff" has succeeded in the negotiation of business, but where the actual results in practice have not fulfilled the brilliant promises made. This unfortunate condition is now in all probability offset by the excellent impression made by American manufacturers supplying France with all manner of materials since the beginning of the war. French engineers have remarked frequently to the writer that the steel and brass products of this country are superior to those produced in their own country. The French came to this country for supplies because they had to, but they came prepared to suspect every one, as witnessed by the rigidity of their inspection and the placing of an inspector in every plant delivering material to them. They have now realized that by far the greater proportion of American manufacturers are doing their utmost to please their customers and that their business methods are absolutely honest. This will all go a long way toward re-establishing the lost confidence. Nevertheless, it would seem to the

writer as though some means should be employed whereby the salesman can prove his statements to the customer. It is suggested, for example, that the steel salesman be provided with sample test bars from different heats, and tables showing the chemical analyses of these heats. Then let the foreign customer pull the bars himself or make whatever tests and analyses he desires. It will, of course, be argued that these test pieces might be taken from special heats or previously annealed and treated, thus nullifying their utility. But this is merely a suggestion and something more satisfactory may ultimately be worked out.

The feeling in Germany against America at the present time seems to be very bitter; thus it is very uncertain whether the United States will be able to export much to that country for some time after peace is declared. The American who goes to Germany to sell steel, however, must have a very good knowledge of its chemistry and manufacture. In fact, this knowledge is almost more important than good salesmanship and skillful approach.

It is absolutely essential that steel producers in this country be allowed to enter into some combination with one another for the purpose of increasing their export trade, as is provided for in the Webb bill. It has just been made known that the lumbermen of this country have entered into such a combination, and they believe that they will not be found guilty of overstepping the Sherman law, which by the way should not be applied to international trade at all.

It cannot be too strongly impressed on the administration at Washington, how necessary this is and efforts to this end should be unceasing until permission is obtained to form such an export agreement between steel manufacturers. This is more especially the case now, since not only have all the European countries their own export syndicates, but now the Allied countries have actually made trade agreements among themselves in order to push Germany to the wall. Whether this will be successful or not, it most certainly will not be without its effect on the foreign trade of this country also.

A good knowledge of the French language is very essential to the success of an export salesman, both in Russia and in France. A well known engineer in Paris told the writer before the war that he did not like to do business with Americans, because none of them talk French and because they always seem to take it for granted that every one talks English. The English used to have the same characteristic, but the men they were sending to France just before the war all had to know French.

It is hoped that these remarks may not be taken amiss. The opportunity now offered to this country is so stupendous, that no effort should seem too great to assure the success most certainly due the wonderful industries of the United States.

ALBERT KAPTEYN, JR.

Auburn, Pa., Oct. 19, 1916.

[In a note accompanying his communication the writer of the above says that he is a Hollander and has been in the United States for six years, with two trips to Europe in between.—EDITOR.]

How Advertisers May Help Buyers

To the Editor: H. B. Twyford in his article on "Two Fundamentals in Purchasing," in The Iron Age of Sept. 21, very properly calls attention to the waste of time on the part of both buyer and seller in answering superfluous inquiries. It is hard to see how all these inquiries can be eliminated, however, as the manufacturer must advertise and new prospects will approach him as a result thereof. But repeated requests for quotations from the same source can be avoided. Where it is impossible to accommodate a customer for some time to come, we always advise him just how far ahead we are sold, or just how long certain types of machines will be occupied on orders already received.

The advertiser can help matters also by being a little more explicit. It is rather disconcerting, for

instance, to forward an inquiry to a manufacturer who advertises springs (either of all kinds or else with no limitation expressed) only to receive a reply that he is not equipped for that particular style. Yet such has

recently been our experience.

Buyers' indexes of sources of supply can easily be made from information received in reply to inquiries sent out, but the starting point must be the reading of the advertisement. Naturally the advertiser wants as much new business as he can get, and what at the time might be considered superfluous requests may be only forerunners of others leading to profitable orders.

H. D. MURPHY.

No Customs Decision on Embroidery Machines

To the Editor: My attention has been called to an article in The Iron Age of Oct. 12 in reference to a customs decision, which you head "Embroidery Machines." I would call your attention to the fact that there has been no decision on embroidery machines. The question of embroidery machines was not before the Board of General Appraisers. There is no dispute at the present time, between us and the Government, as over the classification of shuttles, which are admitted by us to be used in embroidery machines.

Our contention is, and the fact is, that the shuttles are sewing machine shuttles, which are used in an embroidery machine. It is also our contention, and it is a fact, that the embroidery machines in which these shuttles are used are nothing more than gang sewing machines, with a mechanism for producing a pattern on the goods embroidered, and herein lies, in the writer's estimation, the only possible means of dis-tinguishing an embroidery machine from a sewing

machine.

The term "embroidery machine" means nothing in itself, without a qualification. That Congress did not make a clear definition is not the fault of the writer. As a matter of fact, he appeared before the Senate Committee, and tried to get it to make the definition clear.

Now the fact is, that the sewing machine existed before the so-called embroidery machine. In speaking of embroidery machines in this article, I have reference always to the large gang machines, which use anywhere from 500 to 1000 shuttles, and no doubt this is the machine which Congress intended to define, but it

didn't do it.

Sewing machine parts are distinctly mentioned in paragraph 441 of the tariff act, which reads: "Sewing machines . . . whether imported in whole or in part, including repair parts." Our contention, therefore, is simply that the law has defined sewing machine parts, and the mere fact that they are used in a certain type of embroidery machine has no influence on the fact that they are sewing machine shuttles to start with. A comparison, we think, would help matters out If the tariff act were to say that wagon wheels were free, and the International Harvester Company imported a lot of wagon wheels, and used them, as it does, on a certain type of automobile that it makes, we do not think this would change them from being wagon wheels.

The reasoning which contends that the chief use of these shuttles in this country covers their classification is not sound. The question is, What is the article, and not what its chief use is in any one particular place, under certain conditions. For instance, although the type of embroidery machines in which these shuttles are used does use from 500 to 1000 shuttles, yet the number of embroidery machines of this type in use is extremely small. There are probably in the neighborhood of 10,000 in use in the whole world. On the other hand, although the ordinary sewing machine, so-called, uses only one shuttle, yet there are a great many millions in use, so that the aggregate number of sewing machine shuttles in use is tremendously in excess of the

ROBERT J. HEARNE, Secretary and Treasurer Durbrow & Hearne Mfg. Co. New York, Oct. 17, 1916.

Protection for Auction Buyers

We are in receipt of a communication from a machinery dealer setting forth a genuine grievance. A sale of machinery, advertised by a receiver, recently occurred in a Western city. This sale was attended by a large number of buyers from Chicago and elsewhere, who took a lively interest in the proceedings, The machines were auctioned off one by one in regular form, but, after everything had apparently been disposed of, announcement was made by the receiver that bids would be entertained for the entire lot. Everything was then sold as a lot to a new participant in the trans action who had not previously bid on the individual lots. All the machinery dealers present had thus been put to the expense of attending the sale and lost the day from their business without being able to secure any part of the machinery sold.

The question was laid before the members of the Supply and Machinery Dealers' Association, holding its fall meeting at the Hotel Astor, New York Oct. 24, and in the resultant discussion no surprise was expressed over the circumstances of which complaint was made. Advisory-Secretary-Treasurer T. J. Fernley said that in Philadelphia it has been a practice for years for receivers to take individual bids and then sell as a whole, the justification being that a receiver, as an officer of the court, was duty bound to get as much as he could for the property he sold. He thought the only recourse for the would-be buyer was to ascertain in advance the terms under which the sale would be maide.

Members said that with most auction sales it was the custom to advertise the terms of sale. It was conceded that where bids were taken on individual tools and on the lot, the fair way was to take bids on the entire lot first, as otherwise one could total the separate bids and then obtain the property by simply adding dollar or two, to their sum. To the statement that the practice was one which buyers would like to amend general assent was given by those who expressed themselves.

Transcontinental Rate Case Hearings

WASHINGTON, D. C., Oct. 24, 1916.—The Interstate Commerce Commission announces a reopening of the intermountain or transcontinental freight rate case, the new proceeding involving an investigation of the proposal of the carriers to make a blanket rate on manufactured iron and steel from New York, Pittsburgh and Chicago points of 94c, per 100 lb., instead of the present scale of 75, 65 and 55c. respectively. The commission will give hearings in the proceeding in Chicago on Nov. 20, in Salt Lake Nov. 29, in San Francisco Dec. 4, in Portland, Ore., Dec. 11, and in Spokane Dec. 14. Testimony will also be taken in Washington at later dates not yet determined.

The adjustment of these rates has been one of the most difficult tasks the commission has ever undertaken. About a year ago the carriers, following an order of the commission, made an adjustment of the rates, and it was believed that they would remain in force for at least two years. Early last spring, however, the Merchants' Association of Spokane filed a petition declaring that, by reason of the closing of the Panama Canal because of slides and the increased demands for ships for conveyance of traffic between the United States and various European countries, the service by water between the Atlantic and Pacific coasts of the United States had been in large part discontinued. It was, therefore, contended that, water competition hav-ing been practically eliminated, the orders of the com-

mediate points should no longer remain in effect. The commission upon investigation sustained the complaint and directed the railroads to make a adjustment. The carriers, therefore, prepared tariffs and submitted them to the commission, but shippers generally protested, and the commission suspended the rates, notwithstanding it had ordered them instituted.

mission approving rates to the Pacific Coast and inter-

The commission now proposes to reopen the whole It is undercase and take comprehensive testimony. It is under-stood that all the leading iron and steel producers lo

cated east of Chicago will make strenuous protest against the proposal of the carriers to eliminate the differentials and put New York, Pittsburgh and Chicago on the same basis by wiping out the graduated scale and substituting a 94c. blanket rate.

WIRE COMPANY LITIGATION

Suit Against American Steel & Wire Company Under the Sherman Act

In the United States District Court at Boston, Oct. 17, Judge James M. Morton overruled one demurrer and sustained another in the suit for \$750,000 damages brought under the Sherman act by the American Steel Company, Pittsburgh, which has a wire nail plant at Ellwood City, Pa., against the American Steel & Wire Company. The court overruled the demurrer to the account charging monopoly or attempted monopoly in the manufacture and sale of coated wire nails and sus-tained the demurrer to the second count, charging a combination in restraint of trade in coated nails. opinion states that the wire company secured control of 75 per cent of the entire output of wire mills in the United States and then determined to acquire a monopoly in the manufacture and sale of coated wire nails. The plan, it was charged, was to create such difficulties of competition as to drive out of business all with whom the company was unable to come to terms. This was accomplished chiefly, it is charged, by subsidizing various persons, firms and corporations and by underselling competitors.

Judge Morton said: "The defendant had a perfect right, so far as the Sherman act goes, to undersell the plaintiff in ordinary business competition, or for the purpose of putting the plaintiff out of business. It had no right to do so as part of a plan to drive everybody out of the trade in order to obtain a monopoly for itself, which is what is alleged."

As to the second count, Judge Morton stated that many important allegations in the first count were omitted. It contained no description of the trade or business situation to which the alleged conspiracy or combination applied, nor is there any allegation, he declared, that the defendant's acts were intended to affect anybody but the plaintiff.

Other defendants in the suit are Frank Baackes, Chicago, vice-president and a director of the wire com-J. C. Pearson Company and J. C. Pearson Company, Inc., and Frank Ayers, Brooklyn, an officer of the two latter companies. Regarding the liability of these defendants, the court said: "There were not successive attempts of the wire company to secure a monopoly; there was a single continuing one, in which different parties joined successively, and by which the plaintiff was injured. Everybody who joined in the unlawful attempt became liable for whatever injury resulted from the tortious act in which he participated. Whether this fact can be supported, as the plaintiff contends, as alleging a conspiracy in restraint of trade without an explicit allegation to that effect, is doubtful; but upon the grounds stated it seems to me good against all the defendants."

Rathbone & Sard to Build Electric Ranges

The Rathbone-Sard Electric Company, Inc., has been organized to take over the property of the Interstate Storage Company, on Rathbone and Thacher streets, Albany, N. Y., just north of the plant of Rath-bone, Sard & Co. This property has buildings on it now containing over 50,000 sq. ft. of floor space, and the new company is planning to put up an additional building. The present Rathbone-Sard plant will continue the manufacture of Acorn gas stoves and the new plant will be devoted entirely to the manufacture of Acorn electric ranges and bake ovens. At present the factory has an output capacity of between 15,000 and 20,000 ranges a year, and this is to be materially increased when the electric range factory is in running order. The new Albany industry, it is estimated, will

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give employment to 500 men, and, it is stated, will be

give employment to 500 men, and, it is stated, will be the largest electric stove plant in the world.

The new company will be entirely independent of Rathbone, Sard & Co. The following directors have been elected: Ellery A. Baker, Arthur M. Blanchard, H. P. G. Norstrand, Russell E. Sard and W. H. Webster. Officers were elected as follows: Russell E. Sard, president; H. P. G. Nostrand, vice-president and general manager; W. H. Webster, vice-president; Arthur M. Blanchard, secretary and treasurer. Mr. Northur M. Blanchard, secretary and treasurer. Mr. Norstrand, the general manager of the new company, has been identified with Rathbone, Sard & Co. for 11 years in the capacity of general superintendent.

PERSONAL

J. M. Nelson has been appointed superintendent of the Bethlehem Steel Company's open-hearth department No. 2, Saucon plant, succeeding W. H. Bischoff, who resigned to become superintendent of coke ovens, blast furnaces and open-hearth furnaces of the Dominion Iron & Steel Company, Sydney, Nova Scotia. Mr. Nelson was formerly with the Algoma Steel Company, Sault Ste. Marie, Ontario. Mr. Bischoff leaves for Nova Scotia this week.

O. F. Luckenbach, formerly connected with the Oil Well Supply Company, Oil City, Pa., has been appointed superintendent of the drop forge department of the Bethlehem Steel Company's Lehigh plant, succeeding William Hunziker, deceased.

Harry C. Baughman, formerly of the Bethlehem Steel Company and the Braddock (Pa.) open-hearth and duplex departments, has been appointed assistant superintendent of the open-hearth and duplex departments of the Algoma Steel Company's plant at Sault Ste. Marie, Ontario.

Charles S. Kinnison, formerly Western advertising manager for the *Blast Furnace and Steel Plant*, has been appointed general sales manager for the Flota Mica Sales Company, 1201-3 Kresge Building, Detroit.

Frank H. Johnson, room 603, 208 South La Salle Street, Chicago, has been appointed Western sales agent for the Peerless Drawn Steel Company, Massillon, Ohio, manufacturer of cold finished steel. He also represents the Laclede Steel Company, St. Louis, and the Hess Steel Corporation, Baltimore.

Fred W. O'Neil, sales manager of the Nordberg Mfg. Company, Milwaukee, for many years, resigned Oct. 15 to accept an executive position with the Ingersoll-Rand Company, at 11 Broadway, New York. Herbert W. Dow, assistant sales engineer, has been promoted to sales manager of the Nordberg Company. Heads of departments tendered Mr. O'Neil a farewell banquet.

At a meeting of the board of directors of the Internations Commercial Corporation, 44 Whitehall Street, New York, Oct. 6, H. A. Runge was elected vice-president in charge of machinery and heavy hardware. He was for a number of years connected with the export department of Manning, Maxwell & Moore, specializing on machinery, machine tools, railroad materials and sugar plantation machinery and supplies.

A. M. Hirsch has been appointed assistant district manager of the Vanadium Alloys Steel Company at Cincinnati, with offices in the Mercantile Library Building. Charles M. Bigger is general manager of sales of that office.

Robert C. Miller has been appointed purchasing agent of the Staten Island Shipbuilding Company, New York, to succeed W. H. Moore, who has retired from active business.

M. Morino, engineer Imperial Steel Works, Japan, is now in this country to spend a few weeks visiting steel mills and other industrial establishments. He is on his way from London to Tokio, and leaves for Japan from the Pacific coast on Nov. 24.

New Open-Hearth Furnace at Washington

The Washington Steel & Ordnance Company, Washington, D. C., is building an additional basic open-hearth furnace of 35 tons capacity. The present equipment consists of two 15-ton basic furnaces and one 1-ton Stassano electric furnace.

J. K. Larkin & Co., 34 Reade Street, New York City, have recently added black and galvanized pipe to the line of products of the Jones & Laughlin Steel Company which they are already handling. Stocks of pipe fittings, valves, etc., and other material incidental to the pipe business, will be carried in the Larkin warehouses in New York and Brooklyn.

Pittsburgh and Nearby Districts

The National Association of Sheet and Tin Plate Manufacturers, whose headquarters are in the Oliver Building, Pittsburgh, will apply Nov. 8 for a charter under the laws of Pennsylvania.

The Youngstown Foundry & Machine Company, Youngstown, Ohio, has been awarded a large contract for pinion housings for the 8, 10, 12 and 14 in. bar mills to be erected by the Carnegie Steel Company at McDonald, near Youngstown. Inquiries are out from the Carnegie Company for a large amount of other equipment for these new mills, work on which is going on steadily, largely owing to the favorable weather.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, has received an order for installing electrical equipment in 11 thread mills of Marshall Field & Co., Spray, N. C.

At the annual meeting of stockholders of the Westinghouse Air Brake Company held in Wilmerding, Pa., last week, H. H. Westinghouse was re-elected president and the board of directors was also re-elected as follows: Cyrus S. Gray, E. M. Herr, A. L. Humphrey, John R. McGinley, Charles McKnight, John F. Miller, Morris S. Rosenwald, W. D. Uptegraff and H. H. Westinghouse. Amendments to the by-laws were unanimously adopted by which, at the instance of Mr. Westinghouse, the office of chairman of the board was created and the election of all officers, including the president, hereafter vested in the board of directors. At the meeting of the new board for organization immediately after the adjournment of the stockholders, the resignation of Mr. Westinghouse as president was accepted, and he was unanimously chosen chairman of the board, which, under the amended by-laws, now becomes the ranking office of the company. The organization was completed by the election of John F. Miller, president; A. L. Humphrey, vice-president and general manager; S. C. McConahey, acting vice-president; R. F. Emery, secretary and treasurer; Charles A. Rowan, controller.

The annual meeting of stockholders of the Crucible Steel Company of America, Pittsburgh, will be held Nov. 17, at Jersey City, N. J. It is stated unofficially that the earnings of the company for the year ended Aug. 31 were \$13,000,000.

Toluol is now being produced by the Koppers byproduct coke ovens of the Youngstown Sheet & Tube Company, Youngstown.

The Fairmont Mining Machinery Company, Fairmont, W. Va., has placed a contract with the McClintic-Marshall Company, Pittsburgh, for a new factory building, 90 x 120 ft., and a pattern storage building, 40 x 60 ft.

The Wheeling Steel & Iron Company, Wheeling, W. Va., is now operating 18 hot tin mills at its plant at Yorkville, Ohio, and has under construction six more mills, which will be ready for operation about May 1. Some very creditable records for output have been made recently at this plant.

The Republic Rubber Company, Youngstown, Ohio, will issue common stock to the amount of \$1,047,500, the proceeds to be used in making large additions to its plant.

The report that the Republic Iron & Steel Company, Youngstown, Ohio, will build additional by-product coke ovens is officially denied.

The city of Alliance, Ohio, has awarded contracts for new pumping machinery for its waterworks system. A 6,000,000-gal. horizontal, cross-compound, pumping engine goes to the Snow Steam Pump Company, Buffalo, N. Y., and a motor-driven triplex booster pump to the Deming Pump Company, Salem, Ohio.

On Saturday afternoon, Oct. 21, members of the Engineers' Society of Western Pennsylvania made an inspection trip to the plant of the American Zinc & Chemical Company at Langeloth, Pa., about 30 miles from Pittsburgh. A full description of this plant, with illustrations, appeared in The Iron Age of May 13, 1915.

The Marietta Chain & Forging Company, Marietta, Ohio, which has let contracts for the erection of several buildings, all of steel construction, advises that the equipment has all been purchased.

The Sharpsville Boiler Works Company, Sharpsville, Pa., is erecting a new steel building, 100 x 150 ft. It will be equipped with a 10-ton electric crane, the contract for which has been placed with the Euclid Crane & Hoist Company. The new building will be occupied about Dec. 15.

The Valley Forging Company, Verona, Pa., near Pittsburgh, maker of car and special forgings and rail benders, has bought a plot, 120 x 312 ft., in the rear of its present plant, and expects in the near future to erect new buildings and greatly increase its output.

The Erie Foundry Company, Erie, Pa., maker of steam drop hammers, galvanizing equipment, etc., is building an addition, 40 x 200 ft., to its machine shop. The company has purchased some new equipment, including planers, boring mills and drill presses.

The Standard Screw Company, Corry, Pa., has purchased the plant of the Corry Novelty Company, which will be equipped for the manufacture of turnbuckles, bolts, nuts and aeronautical accessories. L. T. Mc-Elroy is manager.

Return of American Industrial Commission from France

The American Industrial Commission, organized under the auspices of the American Manufacturers' Export Association and which sailed from New York on Aug. 26, as noted in these columns on Aug. 24, is expected to return to this country on Oct. 29. A report from the commission through W. W. Nichols, its chairman, is expected at the meeting of the American Manufacturers' Export Association to be held at the Hotel Biltmore, New York, on Oct. 31.

Information thus far received indicates that everywhere in France the commission was given a warmer welcome than was expected. On the going journey the party was met at sea by M. Damour, French deputy and leader of the French Industrial Commission which visited the United States in the winter of 1915 and 1916, and he was accompanied by the mayor of Bordeaux and a delegation of the Chamber of Commerce of that city. In Paris the program was arranged by the National Association for Economic Expansion, the president of which is M. David-Merret, head of the French Chamber of Commerce.

The personnel of the commission as finally constituted, according to the latest bulletin of the association, is as follows:

W. W. Nichols, assistant chairman, Allis-Chalmers Mfg. Company, Inc., New York; J. G. Butler, Jr., vice-president, Brier Hill Steel Company, Youngstown, Ohio; A. B. Farquhar, president, A. B. Farquhar & Co., Ltd., York, Pa.; G. B. Ford, Geo. B. Post & Sons, New York; Noble Foster Hoggson, president, Hoggson Brothers, builders, New York; F. J. Lemaistre, consulting chemical engineer, E. I. duPont de Nemours & Co., Wilmington, Del.; J. R. MacArthur, president, MacArthur Brothers' Company, New York; Dr. C. O. Mailloux, electrical engineer, New York; Curt G. Pfeiffer, vice-president, George Borgfeldt & Co., importers and exporters of general merchandise; J. I. Sague, official delegate, American Society of Mechanical Engineers; E. A. Warren, vice-president, Universal Winding Company, Boston; E. V. Douglass, secretary, American Manufacturers Export Association.

Haynes Stellite Company Service

The manager of each branch office of the Haynes Stellite Company, Kokomo, Ind., has supervision over four to eight expert demonstrators, mechanics and sales, men whose province it is to work out mechanical problems, and show where and how Stellite should be used. The branches, of which there are five, carry a complete stock of standard size standard Stellite tools and arcwelded Stellite tools. The managers and the offices of which they are in charge are located as follows: Roe L. Johnson, 120 Broadway, New York; A. F. Young, 900 Lytton Building, Chicago; G. O. Litt, 910 First National Bank Building, Cincinnati; J. T. Plummer, 911 Citizens Building, Cleveland, and J. J. Cruice, 318 Telegraph Building, Detroit.

OBITUARY

CHARLES J. HEALY, long identified with the cutlery manufacturing industry of this country, died Oct. 21 at his home in New York City, aged 74 years. He was born in Dublin and came to this country when nine years old. He was a member of the firm of Wiebusch & Hilger until about 25 years ago, when he founded the Bridgeport Knife Company, Bridgeport, Conn. At that time Mr. Healy brought 50 expert workmen with their entire families from the Sheffield plants in England to make cutlery in the English fashion. He retired a few years ago. He leaves his widow and three sons.

PROF. DAVID NELSON CAMP, president Skinner Chuck Company, died Oct. 19 at his home in New Britain, Conn., aged 96 years. He was one of the most prominent educators in Connecticut, having been State superintendent of schools from 1856 to 1866, one of the first principals of the New Britain Normal School and a former professor at St. John's College, Annapolis, Md. He was second mayor of the city of New Britain. He was also a director of the New Britain National Bank.

PROF. F. H. ROBINSON, for more than a quarter of a century head of the civil engineering department of Delaware College, died Oct. 17 at his home in Wilmington, Del., aged 66 years. He resigned last spring and in June was elected professor emeritus. Some years ago he was connected with the Edge Moor Iron Works and was also at one time engaged in the engineering business in Wilmington, being a member of the firm of Canby & Robinson.

ROBERT HASTWELL, superintendent of the International Malleable Iron Works, Guelph, Ont., Canada, died Oct. 18 in a local hospital from pleurisy. He was for 25 years in the employ of the Illinois Malleable Iron Company, Chicago, and went to Guelph three years ago as treasurer and sales manager of the International Works, affiliated with the Illinois Malleable Company.

Railroad Car Buying

It is estimated that about 25,000 cars will be bought in the next 30 days, and this follows pretty active purchasing in the last two weeks. Early buying is expected from the New York Central and from the Baltimore & Ohio, and the Atlantic Coast Line appears to be quietly sounding the market.

Among the late purchases may be mentioned the following: Chesapeake & Ohio, 2000 hopper cars; 1000 to the Standard Steel Car Company and 500 each to the Ralston Car Company and the Pressed Steel Car Company, and 1000 car repairs to the Pressed Steel Car Company. Union Tank Line, 2000 cars; 1000 to the American Car & Foundry Company and 500 each to the Standard and the Pressed Steel car companies. The last named has been awarded 1500 gondolas and hopper cars for the Louisville & Nashville. It now appears that the Missouri Pacific has increased its order of 1000 It now appears gondolas to 2500, all placed with the American Car & Foundry Company. The Chicago & Northwestern's latest purchases cover 1500 box cars to the American Car & Foundry Company and 500 ore cars to be built by the Pullman Company, and it is still on the market for 500 stock cars. The Carolina, Clinchfield & Ohio has bought 500 hopper cars from the Pressed Steel Car Company, which company is to provide the repairs on 300 cars for the Erie.

The Findlay Steel Castings Company, Findlay, Ohio, recently incorporated with a capital stock of \$200,000, will build a plant for the manufacture of open-hearth and electric steel castings. Considerable foundry equipment will be required. The officers are E. J. Edwards, president and general manager; E. T. Pelton, vice-president and secretary, and Harry A. Tilden, treasurer.

Iron and Steel Markets

LARGE WAR STEEL NEEDS

Pig Iron Up \$1 to \$2 with Excited Buying

Advances in Finished Steel, with Higher Prices Indicated

Iron and steel markets are advancing with little semblance of restraint, and no week of the year has brought so many evidences of demand outrunning supply and of the projection of that condition far into next year.

With prices of semi-finished steel \$15 to \$20 higher than one year ago, and of finished materials \$20 to \$30 higher, there is even more expectation of further advances than existed in October, 1915.

Pig-iron prices, after months of restraint that has been the puzzle of the whole market, have taken leaps of \$1 to \$2 a ton this week, and in some centers buying has been heavy and excited.

Allied buyers of shell steel are making no effort at finesse on the price for delivery in the second half of 1917, as they were doing four months ago on first half delivery. It is a case of getting the mills to book the steel, and 41/4c. and 41/2c. will be paid on several hundred thousand tons now being negotiated, against 3½c. on the last contracts. It is said unreservedly that France and Italy will take all the war steel our manufacturers can furnish for the second half of next year. One steel company is asked to quote on 100,000 to 300,000 tons.

France's needs are very large. In the case of 20,000 tons of $3\!\!/_{\! 8}$ to $5\!\!/_{\! 8}\text{-in.}$ rounds, for which soft steel was wanted, the buyers now offer to take rollings from shell steel discards. France also asks for 30,000 tons of annealed, galvanized and varnished wire, for fourth and first quarters. wire could not be had and it is not certain that the

modified inquiry can be considered.

Whether export buying amounts to 20 or 25 per cent of productive capacity, its big unit purchases stand out in contrast with the conservative buying for domestic use. Home consumers are not losing sight of possible after-the-war changes. Except for clearly needed products like ship steel makers do not encourage far-future contracts, but consumers show increasing concern to get places on mill books. Steel famine talk is not warranted, for manufacturers try to make full allowance for home needs in all their refusals of export business.

The advance in coke has had no parallel. high as \$7.70 has been paid for prompt furnace coke, and coal and coke are still going up. Car shortage is a large factor in fuel prices and is likely to prove more menacing as winter comes on.

It is estimated that 25,000 railroad cars will be bought in the next thirty days, following the closing of over 10,000 cars in ten days. Such is the call for plates for cars that 4c. is talked of as the 1917 This is not out of line with marine steel at 5c. and 6c. in lots of several hundred tons, while 4½c. was done on more than 4000 tons of ship plates

There is more rail inquiry for 1918, the M. K.

& T. having placed 50,000 tons for that delivery with the Colorado mill, while the Illinois Central has asked for 25,000 tons. The St. Paul, New York Central and Union Pacific still want rails for this

Bookings by Chicago mills in October have approached the record of 1912, when 600,000 tons was entered for the month, and the sales have been

double the shipments.

It is more difficult to keep up with price advances. Sheet sales have been very large, and on galvanized prices have gone up \$3 to \$5 a ton. Most of the tin-plate production of the first half of next year is now under contract.

The Steel Corporation has announced advances in the leading tonnage materials for forward delivery, or to 2.70c. for bars, 2.85c. for shapes, and

3.75c. for plates.

Boiler tubes are unusually active both for home and foreign consumption. A late inquiry is for 6000 tons for South Africa. On 500 tons for domestic delivery over seven months, 30 per cent ad-

vance over late quotations was paid.

The pig-iron market has cut loose remarkably after months of lagging. Chicago reports a scramble for iron, and some makers have advanced quotations \$3 in the week, or to \$22 for No. 2 foundry. Buffalo furnaces, after a week's sales of 100,000 tons, have put No. 2 iron to \$22. The Southern market has been excited, and \$16 is now minimum for No. 2 at Birmingham. Bessemer iron is up \$1 to \$24, Valley furnace, and some sales of basic have been made at \$21. Export demand had taken so large a tonnage that important buyers of foundry and other grades came into the market precipitately.

Pittsburgh

PITTSBURGH, PA., Oct. 24, 1916.

Prices on nearly everything that the makers can possibly sell have gone up the past week from \$1 to as much as \$5 per ton. Bessemer pig iron is up fully \$1, with some sellers asking \$2 and \$3 advance. Galvanized sheets are up \$3 to \$5. The minimum on base sizes and base carbons of Bessemer and open-hearth steel has been fixed for the remainder of this year and first quarter at \$50 per ton by sales. Prompt furnace coke has sold in small lots as high as \$7.70 per net ton at oven. Soft Bessemer wire rods have been taken for export at \$63 per ton. The market seems to be for export at \$63 per ton. The market seems to be going still higher. It is admitted that prices have reached a dangerous level, but the enormous demand keeps coming in, and the mills are asked to name their own prices if they will agree to furnish the material. It is almost impossible to keep up with advances in prices; quotations made to-day that fairly represent the market are too low before a week has passed. is the only material that is not responding in price ad-

Pig Iron.—Bessemer has advanced squarely in actual sales of fair sized lots to \$24 at Valley furnace, with small sales reported for prompt shipment at \$25 and \$26. Basic iron has remained at \$20, with some sellers asking \$21 and \$22 at furnace. No. 2 foundry iron has advanced to \$21, minimum, at Valley furnace, with some sellers asking higher prices. Sales of pig iron in the past week have been light, but there is a fair amount of new inquiry. One lot of 18,000 tons of

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics At date, one week, one month, and one year previous

For Early Delivery

				0 . 00		0-4 05	Ont 10	Cont 97	Oct
Pig Iron, Fer Gross Ton:	1916.	1916.	1916.	1915.	Sheets, Nails and Wire,	1916.	Oct. 18, 1916.	1916.	191
No. 2 N. Philadelphia. 8 No. 2 Vulley furnace No. 2 Southern, Cin'ti No. 2 Birmingham, Ala. No. 2 furnace, Chicago Basic, del'd, eastern Pa. Rasic, Valley furnace		\$20.50 20.00 18.40 15.50 19.00 20.00 20.00 23.95	\$19.50 18.50 17.40 14.50 18.00 19.75 19.00 22.95	\$16.25 15.00 15.40 12.50 15.25 17.00 16.95	Per Lb. to Large Buyers: Sheets, black. No. 28, P'gh Sheets, galv., No. 28, P'gh Wire nails, Pittsburgh Cut nails, Pittsburgh Fence wire, base, P'gh Barb wire, galv., P'gh		Cents. 3.30 4.40 2.70 2.60 2.65 3.55	Cents. 3.00 4.25 2.60 2.60 2.55 3.45	2. 3. 1. 1.
Bessemer, Pittsburgh Malleable Bess., Ch'go*	21.50	19.50	19.00	15.50	Old Material. Per Gross To	n:			
Gray forge, Pittsburgh L. S. charcoal, Chicago	20.95 20.25	20.45 20.25	19.20 19.75	14.70 15.75	Iron rails, Chicago Iron rails, Philadelphia Carwheels, Chicago	22.00 21.00 14.50	20.00 21.00 13.00	19.25 20.00 11.75	13. 17. 12.
Rails, Billets, etc., Per Gr	ross Ton:				Carwheels, Philadelphia	16.00	15.50	15.50	13.
Bess rails, heavy, at mill 0-h rails, heavy, at mill Bess billets, Pittsburgh. 0-h billets, Pittsburgh. 0-h sheet bars, P'gh	33,00 35,00 50,00 50,00 50,00 50,00 55,00	33.00 35.00 45.00 45.00 45.00 69.00 50.00 55.00	33.00 35.00 45.00 45.00 45.00 69.00 48.00 55.00	28.00 30.00 25.00 26.00 27.00 40.00 32.00 33.00	Heavy steel scrap, P'gh Heavy steel scrap, Phila Heavy steel scrap, Ch'go No. 1 cast, Pittsburgh No. 1 cast, Philadelphia No. 1 cast, Ch'go (net ton) No. 1 RR. wrot, Phila No. 1 RR. wrot, Ch'go(net)	19.00 16.00 17.75 16.00 16.00 14.75 22.50 18.00	18.50 16.00 16.75 16.00 16.00 13.50 22.00 17.75	16.50 14.75 16.25 15.00 16.00 12.25 20.00 16.50	14. 11. 13. 14. 10. 16. 11.
Finished Iron and Steel.					Coke, Connellsville, Per N	et Ton a	t Oven:		
Per Lb. to Large Buyers: Iron bars, Philadelphia Iron bars, Pittsburgh Iron bars, Chicago	Cents. 2,659 2,75 2,35	Cents 2.659 2.75 2.35			Furnace coke, prompt Furnace coke, future Foundry coke, prompt Foundry coke, future	\$7.00 3.75 5.00 4.50	\$5.00 3.50 3.75 4.00	\$3.00 2.85 3.25 3.50	\$2.
Steel bars, Pittsburgh	2.75	2.75	2.60	1.50	Metals,				
Steel bars, New York Tank plates, Pittsburgh. Tank plates, New York Beams, etc., Pittsburgh Beams, etc., New York Skelp, grooved steel, P'gh. Skelp, sheared steel, P'gh. Steel hoops, Pittsburgh	2.919 4.00 4.169 2.75 2.869 2.50 2.60 3.00	2.918 4.00 4.169 2.75 2.869 2.50 2.60 3.00	4.00 4.169 2.75	1.50 1.669 1.50	Per Lb. to Large Buyers: Lake copper, New York. Electrolytic copper, N. Y. Spelter, St. Louis. Spelter, New York. Lead, St. Louis. Lead, New York. Tin. New York.	Cents. 28.50 28.50 10.00 10.25 6.92 1/2 7.00 41,25	Cents. 28.50 28.50 9.50 9.621/2 6.85 7.00 40.75	Cents. 28.00 28.75 8.75 9.00 6.85 7.00 38.6236	Ce 17. 17. 14. 14. 4. 33.
*The average switching c		delive	ery to fo	undries in	Antimony (Asiatic), N. Y. Tin plate, 100-lb. box, P'gh	13.00 \$5.75	13.00 \$5.75	11.00 \$5.75	\$3.

Bessemer iron is wanted for export and the inquirer states he has sounded all the more prominent Bessemer making centers, but so far has not been able to get it. It is not unlikely this iron would bring \$25 or higher at Valley furnace if any sellers could furnish it, the iron being wanted for fairly prompt shipment. The American Iron & Steel Mfg. Company, Lebanon, Pa., has an inquiry in this market for 10,000 tons of basic iron and the Ohio Mold & Foundry Company, a new interest that proposes to make ingot molds at Cincinnati, has an inquiry out for 10,000 to 12,000 tons of Bessemer. Prices on all grades of pig iron show every sign of going higher. We quote standard Bessemer iron at \$24 to \$25; basic, \$20 to \$21; malleable Bessemer, \$21 to \$22; gray forge, \$20 to \$21, and No. 2 foundry, \$21 to \$22, all at Valley furnace, the freight rate for delivery in the Pittsburgh and Cleveland districts being 95c. per ton.

Billets and Sheet Bars .- The nominal price of \$45, Pittsburgh or Youngstown, on soft Bessemer and openhearth billets and sheet bars has disappeared. Fairly heavy sales of base sizes and base carbons of billets and sheet bars for delivery over the remainder of this year and in first quarter of 1917 have been made at \$50, maker's mill. One leading steel mill has been offered in the last few days \$55 for all the surplus Bessemer and open-hearth steel that it can furnish up to July 1, but replied that it had no steel to spare. large quantities of small ingots are being bought by steel mills and also by consumers from numerous steel casting plants, prices on this steel ranging from \$50 up to probably \$60 at point of shipment. Prices on forging billets are higher and the new demand is active. note a sale of 100 tons of base sizes and base carbons of forging billets at \$72.50, and also 500 tons for delivery in first quarter of next year at \$74, Pittsburgh. We now quote base sizes and base carbons of open-hearth billets and sheet bars at \$50 to \$55 at mill, Youngstown on Pittsburgh, and forging billets at \$73 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes

and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take \$1 extra.

Ferroalloys .- Prices on Bessemer ferrosilicon have been advanced \$2 per ton at furnace, but before this advance was made most consumers had covered their needs over the first half and in some cases over all of 1917. One is reported to have bought 8000 to 9000 tons of 10 per cent; another about 4000 tons, and a third about 3000 tons. We note a sale of 750 tons of 10 per cent for delivery in the first half at \$33 per gross ton at furnace. One furnace that makes the gross ton at furnace. One furnace that makes the product is reported to be sold up to July. We now quote 9 per cent at \$32; 10 per cent, \$33; 11 per cent, \$34; 12 per cent, \$35; 13 per cent, \$36.50; 14 per cent, \$38.50; 15 per cent, \$40.50, and 16 per cent, \$43. quote 7 per cent silvery at \$26.50; 8 per cent, \$27; 9 per cent, \$27.50; 10 per cent, \$28; 11 per cent, \$29, and 12 per cent, \$30. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of \$2 per gross ton to the Pittsburgh district. Prices on 50 per cent ferrosilicon for delivery next year have been advanced about \$10 per ton, and is now quoted in lots up to 100 tons at \$100; 100 tons to 600 tons, \$99; over 600 tons, \$98, all per gross ton, f.o.b. Pittsburgh. The new inquiry ferromanganese is not active and prices are only fairly strong. English 80 per cent is held at about \$164, seaboard, while domestic 80 per cent is offered at \$163, or less, delivered. We quote 18 to 22 per cent spiegeleisen at \$45 to \$50, and 25 to 30 per cent at \$60 to \$70, delivered.

Steel Rails.—Quite large orders for standard sections are being placed by railroads for delivery late in 1917, and the local mill reports specifications against contracts coming in freely. The new demand for light rails is more active than for some time, the coal interests buying heavily, while the lumber trade is also sending in fair-sized orders. Several of the rerolling rail mills have lately made good sales of light rails for export, for which higher than domestic prices were obtained. We quote 25 to 45 lb. sections at \$47; 16 and 20 lb., \$48;

12 and 14 lb., \$49, and 8 and 10 lb., \$50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at \$33 and of open-hearth \$35, per gross ton, Pittsburgh.

Plates.—Orders for steel cars continue to come out quite freely. The Pennsylvania Lines West have placed 4000 steel underframes with the Cambria Steel Company and the Lines East have asked bids on 4000 to 6000 steel underframes. It is said inquiries are in the market for about 10,000 cars. The Carnegie Steel Company has taken 14,000 tons of plates for delivery late next year for boats to be built at Seattle, Wash. All kinds of prices are ruling on plates. The Carnegie Steel Company is quoting ¼-in. and heavier sheared plates at 3c. at mill for such deliveries as it can make, which would not be inside of a year or more, while another leading mill is quoting 3.50c. minimum for delivery in the second half of 1917. For delivery in two to four months, prices range from 4.50c. to 5c. at mill. It is said small lots for shipment in six to eight weeks have been sold above 5c. at mill. Several mills can make deliveries on universal plates in two to three months, on which they quote 3.25c. to 3.50c. at mill.

Structural Material.—In spite of the high prices ruling and the greatly delayed deliveries from the mills, the new inquiry is quite active. The Jones & Laughlin Steel Company has taken 1000 tons for an extension to the Euclid Building, Cleveland, Ohio, and 1200 tons of furnace bindings for the new open-hearth steel plant of the Trumbull Steel Company, Warren, Ohio. The McClintic-Marshall Company has taken 800 tons for extensions to the plant of the Aluminum Ore Company, East St. Louis, 1200 tons for new steel buildings for the same interest, also 2000 tons of bridge work for the Pennsylvania Railroad and 1000 tons for the Manasquan River bridge on the New York & Long Branch Railroad. The American Bridge Company has taken 900 tons for the new Masonic Temple, Cleveland, Ohio. The minimum price on beams and channels up to 15 in. is now 2.70c. at mill for delivery in second and third quarters of next year. Small lots from stock for reasong bly prompt shipment bring 3c. to 3.25c., Pittsburgh.

Sheets.-The demand for all grades of sheets is enormously heavy, and prices are steadily advancing, particularly on galvanized, which are up this week from \$3 to \$5 per ton. The American Sheet & Tin Plate Company has changed its method of quoting on galvanized sheets, and is now holding Nos. 3 to 8 at 3.50c. and 10 to 12 at 3.25c., the other gages being on the same basis as Bessemer black. The export demand is also heavy and the mills are simply swamped with business. Every indication points to prices going still higher. There is an insistent demand for sheets from the carbuilders, but none of the mills can make deliveries as promptly as wanted by this class of the trade. The American Sheet & Tin Plate Company is still quoting 4.50c. on No. 28 galvanized sheets, but its entire output for the first quarter has been allotted. We quote: Blue annealed sheets, Nos. 3 to 8, 3.40c. to 3.50c.; Bessemer black, No. 28, 3.40c. to 3.50c.; No. 28 galvanized, 4.75c. to 4.85c.; tin-mill black plate, No. 28, 3.30c. to 3.40c., all f.o.b. Pittsburgh. We note sales of about 1500 tons of galvanized sheets for delivery in the first quarter at 4.75c. to 4.85c. at mill.

Tin Plate.—Most of the output of the mills has been sold for the first half and there have been large contracts for delivery in the second half with no fixed price, this to be whatever may be arranged hereafter. Consumers seem to fully realize the tense situation in tin plate and have importuned the mills to put them on their books for second half delivery. It is said that, with the possible exception of one interest, no tin plate has been sold for first half at less than \$5.75 per base box, and a good deal has been placed at \$6. It is estimated that export inquiries at present total close to 3,000,000 boxes, but on these nearly all the larger mills are refusing to quote. Some in the trade predict that if present conditions continue, and no peace proposals are started in the meantime, tin plate for second half delivery may be as high as \$7 per base box. We quote

tin plate at \$5.75 to \$6 per base box, f.o.b. Pittsburgh, for first half of the year delivery. We quote terne plate, 200-lb. package, carrying 8 lb. of coating, at \$9.50 per package; I.C., \$9.80; 12-lb., I.C., \$10.75; 15-lb., I.C., \$11.15; 20-lb., I.C., \$11.85; 25-lb., I.C., \$12.65; 30-lb., I.C., \$13.45; 35-lb., I.C., \$14.30; 40-lb., I.C., \$15.10, all f.o.b. Pittsburgh.

Shafting.—Very large contracts for shafting for delivery in the first quarter and first half of next year have been placed, the more desirable and larger contracts going at 20 per cent off and the smaller at 15. It is said that purchases of shafting by the automobile trade are fully 50 per cent larger than at this time last year, and the screw stock machine people and implement makers are also buying more heavily. However, makers of shafting are catching up to some extent on back orders and earlier deliveries can be had. One prominent maker is said to be in position to promise deliveries on new orders in eight to ten weeks. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in the last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Wire Products.-All prices on wire products have been advanced \$2 per ton, effective from Thursday morning, Oct. 19. This has been expected for some time and was made because of the heavy demand. Local makers say that they have their output sold up for two or three months and are turning down business nearly every day. The French Government is inquiring through J. P. Morgan & Co. for 30,000 to 35,000 tons of plain, galvanized, annealed and varnished wire for delivery this year, but it is doubtful whether any of the wire mills is in shape to make the delivery. mills need their entire output for their domestic trade. It is asserted that there will not be enough wire nails to satisfy the trade the next three or four months. Prices are as follows: Wire nails, \$2.70, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire is \$2.75 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.65; galvanized wire, \$3.35; galvanized barb wire and fence staples, \$3.55; painted barb wire, \$2.85; polished fence staples, \$2.85; cement-coated nails, \$2.60, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent for cash in 10 days. Discounts on woven wire fencing are 59 per cent off list for carload lots, 58 per cent for 1000-rod lots and 57 per cent for small lots, f.o.b. Pittsburgh.

Railroad Spikes and Track Bolts.—It is reported that the Baltimore & Ohio Railroad has closed for upward of 25,000 kegs of spikes for delivery in 1917 for new track construction and also for 10,000 to 15,000 kegs for maintenance of way for delivery in the first half. Inquiries are in the market for 15,000 to 20,000 kegs, and indications are that buying for delivery in 1917 will soon be quite heavy. The price of \$2.65 per 100 lb. is regarded as low, and some makers strongly insist on an early advance. Makers of track bolts say that the demand is heavy for first half and prices are firm. We quote track bolts with square nuts at 4.50c. to 4.75c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. Prices on spikes are as follows:

Standard railroad spikes, $4\frac{1}{2}$ x 9/16 in. and larger. \$2.55 to \$2.75; railroad spikes, $\frac{1}{2}$ to 7/16 in., \$2.75 base; railroad spikes, $\frac{1}{2}$ in. and 5/16 in., \$3.05 base; boat spikes, \$2.80 base, all per 100 ib. f.o.b. Pittsburgh.

Rivets.—The steadily higher prices on steel, together with the heavy demand, will likely result in an early advance in prices of rivets. Some makers say that for fairly prompt delivery they can get from \$1 to \$2 per ton advance over present prices. The export and domestic demand are both very active, and makers have their output well sold up for the next three or four months. Makers' prices are firm and are as follows: Buttonhead structural rivets, ½ in. in diameter and

larger, \$4 per 100 lb., base, and conehead boiler rivets, same sizes, \$4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Iron and Steel Bars .- Mill prices on steel bars for delivery in the last half of 1917 range from 2.70c. to 2.75c. at mill. It is said one maker is quoting in some cases as low as 2.60c., but for very indefinite delivery. The implement trade is reported as buying bars freely on contracts for deliveries running through the first half. The carbuilders are also buying steel bars more freely than for some months, most of this business being placed at 2.60c. at mill, the buyers having had options on a sufficient quantity to take care of the cars on which they were bidding, and for which they have since secured orders. The new demand for reinforcing steel bars is heavy, and prices are very strong. Some inquiry is still in the market for steel rounds, and it is said the leading interest recently took a very large contract for the Allies for delivery late in 1917. We quote steel bars at 2.70c. to 2.75c. at mill for delivery in the first quarter and first half of 1917, while for shipment from warehouse stocks prices rule as high as 3.25c. We quote refined iron bars at 2.75c. to 2.85c., and railroad test bars at 2.85c. to 2.90c., f.o.b. Pitts-

Cold-Rolled Strip Steel .- Reports are that large contracts for cold-rolled strip steel for delivery in the first half have been placed at \$6,25 to \$6.50 per 100 lb., f.o.b. Pittsburgh. The foreign demand is active, but some makers are not bidding, as, with obligations already on their books and in sight, their entire utput for the first half is practically under contract. We quote cold-rolled strip steel on contracts for first quarter delivery at \$6.25 to \$6.50 and on small lots for shipment this year from \$6.75 to \$7. Terms are 30 shipment this year from \$6.75 to \$7. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Nuts and Bolts.-Large consumers are now trying to cover their needs for the first half, but some makers are not willing as yet to sell for delivery so far ahead, owing to the uncertainty as to prices of steel bars and shortage in labor. Deliveries of steel by the mills are backward, restricting the output of nuts and bolts considerably. Prices are very firm and an early advance is looked for. Discounts are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days.

Carriage bolts, small, rolled thread, 50 and 5 per cent; small, cut thread, 40, 10 and 5 per cent; large, 35 and 5 per

Machine bolts, h. p. nuts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50 per cent; large, 40 and 5 per

machine bolts, c. p. c. and t. nuts, small, 40 and 10 per cent; large, 35 per cent. Blank bolts, 40 and 5 per cent. Blott ends, h. p. nuts, 40 and 5 per cent; with c. p. nuts, 35 per cent. Rough stud bolts, 15 per cent. Lag screws (cone or gimlet point), 50 and 5 per cent.

Forged set screws and tap bolts, 10 per cent. Cup and round point set screws, case-hardened, 60 per cent. Square or hexagon head cap screws, 55 per cent. Flat, button, round or fillister head cap screws, 30 per cent.

Nuts, h. p. sq., tapped or blank, \$2.70 off list; hex., \$2.70 off. Nuts, c. p. c. and t. sq., tapped or blank, \$2.40 off; hex., \$2.80 off. Semi-finished hex. nuts, 60 and 5 per cent.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 5 per cent.

Wire Rods.-There is almost a famine in rods. Most makers are refusing to quote except to their regular trade, and in some cases are turning down inquiries from customers, stating they cannot possibly spare the rods. We note a sale of 1000 tons of soft Bessemer or open-hearth rods at \$63 and one of 1500 tons at 862, f.o.b. Pittsburgh, for export. Some consumers have not yet covered their rod needs for first quarter and will likely have trouble in finding mills that will supply them. There is a wide range in prices, soft Bessemer and open-hearth rods being quoted from \$55 to \$65 per ton, f.o.b. Pittsburgh.

Merchant Steel.-Consumers are importuning the mills to cover their needs for the first half, but the

mills either refuse to do this or else quote prices much higher than are now ruling. There is a scarcity in supply and the mills are back in shipments eight to ten weeks or longer. Prices are very strong and likely to be higher. We quote: Iron-finished tire, 1/2 x 11/2 in. and larger, 2.75c., base; under 1/2 x 11/2 in., 2.85c.; planished tire, 2.90c.; smooth channel tire, % to % and 1 in., 3c. to 3.10c.; 11/2 in. and larger, 3.10c.; toe calk, 3.25c. to 3.50c., base; flat sleigh shoe, 2.75c.; concave and convex, 2.85c.; cutter shoes, tapered or bent, 3.50c. to 3.75c.; spring steel, 4c. to 4.10c.; machinery steel, smooth finished, 3.10c. to 3.25c., all f.o.b. at mill.

Hoops and Bands.-The nominal price of a leading maker of steel bands remains at 2.70c. and on hoops at 3c. for such deliveries as it can make, which would not be before the second half. Other makers that can deliver about the second quarter are quoting steel bands as high as 3c. and steel hoops at 3.25c. at mill. We therefore quote steel bands at 2.70c. to 3c., with extras as per the steel bar card, and steel hoops at 3c. to 3.25c., f.o.b. Pittsburgh, prices depending largely on the deliveries wanted.

Wrought Pipe. -A local mill has taken a contract for 85 miles of 10-in. pipe for delivery over the next three or four months. New inquiry for oil-country goods and also for pipe for gas and oil lines is heavy. Several leading pipe mills have already booked up to this time practically double the amount of business they took in all of 1915, and have more than two months to go on. On lap-weld and oil-country goods local mills say they are sold up for five to six months, but on buttweld pipe can make delivery in six to eight weeks. Another advance in pipe is said to be under consideration by the leading makers and may be announced at any time. Discounts are very firmly held, and any mill that can make fairly prompt deliveries is able to get premiums over regular prices. Discounts are given on another page.

Boiler Tubes.-Local mills are sold up on locomotive and merchant tubes for practically an entire year, this applying to both iron and steel tubes. On seamless steel tubing the two local makers are practically sold up for all of 1917 and are not actively seeking new business. An advance in prices on boiler tubes is looked to come at any time. Discounts are given on another page.

Coke.—The coke market is running wild, sales of prompt furnace coke having been made at as high as \$7.70 per net ton at oven. In some quarters there is a suspicion that brokers are selling coke to each other, but this is not verified. In any event, there is a fairly active demand for furnace coke, and producers who can furnish the best grades can practically name their own prices. Ordinary run-of-mine coal has sold as high as \$3.50 per net ton. We can report that two contracts for high-grade furnace coke, one for 18,000 tops and another for about 12,000 tons a month, for delivery in first half, have been closed at \$3.75 per net ton at oven. Prices on foundry coke have also advanced, but not to the extent of furnace coke. We quote best grades of blast-furnace coke for prompt shipment at \$7 to \$7.50 and on contracts \$3.75 to \$4 per net ton at oven. predicted that blast-furnace coke will sell on contracts before the end of this year at \$5 per net ton at oven or We quote 72-hr. foundry coke of best grades at higher. \$5 to \$6 per ton and on contracts \$4 to \$4.50 per net ton at oven. The Connellsville Courier reports the output of coke in the upper and lower Connellsville regions for the week ended Oct. 14 as 404,806 net tons, a decrease over the previous week of 11,320 tons.

Old Material.—The market on old material is the only one identified with the iron and steel trades that is lagging. Prices do not move up in spite of the fact that Bessemer and basic pig iron have advanced \$3 to \$4 per ton in the past month. Large consumers seem to be covered for the time being and are not actively buying, while, on the other hand, dealers are certain the market will advance and are not trying to press sales. It is claimed that heavy melting steel scrap has old in fairly large quantities at \$19, but at the same time it is available at about \$18.50, delivered. There is a fair demand for low phosphorus melting stock, which has sold at \$22 per gross ton, delivered. Prices quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steu- benville, Follansbee, Sharon, Monessen, Midland and	21950	to	e19.00
Pittsburgh, delivered	16.00	00	10.00
No. 1 foundry cast	16.00	LO	10.20
Rerolling rails, Newark and Cam-			
bridge, Ohio, Cumberland, Md., and			
Franklin, Pa			19.25
Hydraulic compressed sheet scrap	14.50	to	14.75
Bundled sheet scrap, sides and ends,			
f.o.b. consumers' mills, Pittsburgh			
district	11.50	to	11.75
Bundled sheet stamping scrap	11.00	to	11.25
No. 1 railroad malleable stock	15.25	to	15.50
Railroad grate bars	11.25	to	11,50
Low phosphorus melting stock	21.50	to	22.00
Iron car axles	35.00		
Steel car axles	36.00		
Locomotive axles, steel			
No. 1 busheling scrap	14.00		
Machine-shop turnings	7.50		
Old carwheels	14.50		
Cast-iron borings	9.00		
*Sheet-bar crop ends	19.00		
No. 1 railroad wrought scrap	19.00		
	10.50		
Heavy steel axle turnings	13.00		
Heavy breakable cast scrap	10.00	50	10.00

*Shipping point.

O. W. Mason, formerly manager of sales for the Fownes Brothers interests at Pittsburgh, has become affiliated with Hickman, Williams & Co. as Eastern manager, and will have charge of their business in all territory east of Johnstown, Pa. W. L. Hoffman, resident manager of Hickman, Williams & Co. at Philadelphia, will continue in that capacity.

Chicago

CHICAGO, ILL., Oct. 25, 1916.—(By Wire.)

Within a week, foundry, malleable Bessemer and basic pig iron have advanced from \$19.50 to \$22 at This spectacular rise has been co-Chicago furnace. incident with the making of numerous and large sales of iron and the melter now sees confronting him the converging circumstances of threatened ore shortage, higher prices for ore and coke, competition from abroad for all the iron that the furnaces have left to sell and one of the most serious car shortages that ever hampered shippers. The market is headed, in the opinion of both buyers and sellers, for recordbreaking price levels. In respect of prices and limitations upon supply, the scrap iron and steel situation is a close parallel and quotations are jumping. For steel scrap, \$18 has been paid, for wrought scrap \$18.25, for cast scrap \$15, and for other grades relatively higher The market is awaiting a general advance in prices. the prices of the heavier rolled steel products, particularly shapes, bars and plates, one large interest having already put its quotation for Bessemer bars for delivery this year at 2.85c., Pittsburgh, following sales of a round tonnage. Sales of steel by Chicago mills in October closely approached the record months of 1912, when over 600,000 tons was booked and were more than double shipments. It is safe to say that 75 per cent of the expected output of the local mills for 1917 has been sold. The Illinois Central is in the market for 1918 rails, and three other lines are asking for 5000 to 15,000 tons of rails to be delivered this year. The Missouri, Kansas & Texas is reported to have placed 50,000 tons of 1918 rails with the Pueblo mill. An advance in prices of steel out of store is being made this week.

(By Mail)

Pig Iron.—The buying movement, instead of working itself out as consumers gradually covered for their expected requirements, has suddenly developed into a scramble for iron, and quotations have been advanced as much as \$3 per ton within the week. Not since 1907 have prices been so high nor the market so closely verging upon a runaway situation. For malleable and basic iron, \$22 per ton at Chicago furnace has been asked, sales having been made in rapid succession at \$20, \$21 and \$21.50. The influence of at least four factors having a bearing upon pig-iron prices has been gradually

growing in definiteness and appears now to have made itself felt in concrete form. There is the fear of raw material shortage, with a certainty of higher prices; the furnaces have taken up all of the slack in their production through sales of iron for export at high prices; the export market continues to compete for a large part of the available tonnage, and the shortage of cars, as it has begun to be felt, is seen as a problem of utmost seriousness through the winter. Among those in the market are some of the largest consuming interests. A large user of malleable, having out an inquiry for 6000 tons, bought largely last week of char-coal iron at a price equivalent to \$19.25, Chicago, buying also malleable iron from Ohio and about 2000 tons foundry iron at Chicago. Other buyers of quantities up to 2000 tons included those who had made no previous purchases, as well as others who increased contracts made but a few weeks ago. The rapid advance in prices has accentuated the eagerness of consumers to get under cover rather than checked the ac-The awakening of demand for iron for prompt shipment has been augmented by numerous requests for the anticipation of first half contracts by liberal shipments in November and December. The furnace situation in the South presents a close parallel to that in the North. While there is some iron of standard grade still available on the basis of \$16, Birmingham, the greater part of producing capacity is out of the market and some makers ask as high as \$17. Quotations of competitive high phosphorus Northern iron are being made on the basis of \$17, Birmingham, and it seems probable that the fear of car shortage will place a premium on iron from local furnaces as against the long-haul iron from the South. Southern silvery irons, which have been weak, are now being held, particularly by the Tennessee furnaces, at prices equivathose asked for Ohio silvery. A sale of 10,000 tons of basic is reported at St. Louis and, in this market, quotations are out on a round tonnage for first half with some inquiry for second half. For the latter delivery producers are asking such premiums as are intended to discourage inquiry. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of \$1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5\$20.25 to \$	20.75
Lake Superior charcoal, No. 1 20.75 to	21.25
	21.75
Northern coke foundry, No. 1 22.50 to	23.00
Northern coke foundry, No. 2 22.00 to Northern coke foundry, No. 3 21.00 to	$\frac{22.50}{21.50}$
Southern coke, No. 1 f'dry and 1 soft 21.00 to	21.50
Southern coke, No. 2 f'dry and 2 soft 20.00 to	21.00
Maileable Bessemer	22.00
Low phosphorus	40.00
Silvery, 8 per cent	35.50

Rails and Track Supplies.—Several inquiries for rails for prompt shipment are in the market for quantities ranging from 5000 to 15,000 tons. The Chicago, Milwaukee & St. Paul, the New York Central and the Union Pacific are among those asking for rails to be delivered this year. For 1918 delivery, inquiry is out from the Illinois Central for an indefinite tonnage, and the Missouri, Kansas & Texas is reported to have placed 50,000 tons with the Colorado mill. An inquiry received from the Illinois Central by some of the mills calls for 25,000 tons. With the inquiry for rails has come a corresponding inquiry for track fastenings and some sales, in which connection the weakness in the price of spikes is still apparent. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, \$52 to \$54, f.o.b. mill. net ton; standard section Bessemer rails, Chicago, \$33, base; open-hearth, \$35; light rails, 25 to 45 lb., \$40; 16 to 20 lb., \$41; 12 lb., \$42; 8 lb., \$43; angle bars, \$2c. Chicago.

Structural Material.—Higher prices for steel, while not yet announced, appear certain to be named, some of the independent mills having already advanced their

The buying of railroad equipment grows in quotation. volume and inquiry yet to be closed covers several thousand cars. bought 1000 gondolas from the Pullman Company and 1500 wood box cars from the American Car & Foundry The Missouri Pacific has ordered 1500 cars, Company. the Northern Pacific will build 500, the Union Pacific is in the market for 1000 box and 1500 automobile cars and the Duluth, South Shore & Atlantic wants 500 of miscellaneous types. Contract awards for fabricated steel last week were individually of limited size. In all, about 2000 tons is reported, of which the Minneapolis Steel & Machinery Company took 600 tons. The Pacific Rolling Mill will supply 500 tons for a Union Iron Works building at San Francisco and the South Halsted Street Iron Works and the Vierling Steel Company each took an order for about 200 tons. of the 5000 tons for the new Burlington freight house at Chicago has not yet been made. We quote for Chicago delivery of structural steel from mill 2.889c.

We quote for Chicago delivery of structural steel out of jobbers' stocks, 3.25c.

Plates.—The selling of plates continues on about the same basis as has been reported for some weeks, though the minimum quotations, at which mills have been contracting for deliveries at their convenience, seem unlikely to hold much longer. Sales of plates for Japan, among which one transaction covering 900 tons at 4c., Pittsburgh, is illustrative, continue to be made. Prices for prompt shipment, whether of narrow or wide plates, are firm beyond the power of any purchaser to win concessions and the large jobber and the small manufacturer are paying alike. We quote for Chicago delivery of plates from mill, at its convenience, 3.189c. For prompt shipment we quote 3.439c. to 3.689c. in widths up to 72 in., and for wide plates 4.189c. to 4.689c.

We quote for Chicago delivery of plates from jobbers' stocks, 3.75c.

Sheets.—The demand for both black and galvanized sheets is absorbing every offering of the mills. One independent mill representative sold in two days his quota of his mill's first half tonnage of galvanized sheets, for which prices as high as 4.75c., Pittsburgh, were obtained. At the present level of prices sheets are more nearly on a basis of equity with other finished products, and for the second half larger mills will doubtless be more willing to put a normal portion of their steel into sheets, whereas there has been for some time a diverting of steel to other forms of finished products. We quote, for Chicago delivery, blue annealed, No. 16 and heavier, 3.289c. to 3.439c.; box annealed, No. 17 and lighter, 3.589c. to 3.689c.; No. 28 galvanized, 4.689c. to 5c.

Prices for black and galvanized sheets out of stock have been advanced from \$2 to \$4 per ton and we quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed 140c; No. 28 black, 3.80c. to 3.90c.; No. 28 galvanized, 5.15c in 5.25c.

Bars.—Local bar-iron mills have closed a large amount of business for first half delivery on the basis of 2.35c., and the asking price has now been advanced \$2 per ton. Sales thus made leave a limited amount unsold and available for first quarter delivery. There has also been considerable activity in steel bars, one independent mill having booked a round tonnage for early delivery, following which its price has been advanced to 2.85c., Pittsburgh. The continuance of the 2.60c., Pittsburgh, quotation seems likely to be terminated very shortly. For rail-carbon steel there is a less consistent demand, the requirements of reinforcing bars for fall construction work having been largely placed. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.789c.; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

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\$40

We quote store prices for Chicago delivery: Soft steel bars, 3.25c.; bar iron, 3.25c.; reinforcing bars, 3.25c. base with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting net list.

Rivets and Bolts.—There has been some recent buying of rivets, in which connection the weakness in prices for early shipment was further confirmed, a large part

of the sales being on the basis of 3.75c., Pittsburgh. For contracts 4c. still prevails. In a similar manner, recent inquiry from the railroads for bolts and nuts has brought out more favorable discounts than are quoted below, despite the fact that the larger makers have little to offer the buyer. We quote as follows: Carriage bolts up to % x 6 in., rolled thread, 50-5; cut thread, 40-10-2½; larger sizes, 35-2½; machine bolts up to % x 4 in., rolled thread, with hot pressed square nuts, 50-10; cut thread, 50; large size, 40-5; gimlet-point coach screws, 50-5; hot pressed nuts, square, \$2.70 off per 100 lb.; hexagon, \$2.70 off. Structural rivets, % to 1½ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices for rivets have been advanced and we quote as follows: Structural rivets, 4.25c.; boiler rivets, 4.35c.; machine bolts up to 3 x 4 in., 50; larger sizes, 40-5; carriage bolts up to 3 x 6 in., 40-10; larger sizes, 35-5; hot pressed nuts, square, \$3, and hexagon, \$3 off per 100 lb.; lag screws, 50-5.

Wire Products.—The advance in prices announced last week was coincident with the usual gathering in of orders and contracts on the basis of outstanding quotations. There is no let-up in the pressure on the wire mills. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, \$2.939; wire nails, \$2.889; painted barb wire, \$3.039; galvanized barb wire, \$3.739; polished staples, \$3.039; galvanized staples, \$3.739; all Chicago.

Cast-Iron Pipe.—The only inquiry of size for pipe for municipal purposes is that for Lake Crystal, Minn., amounting to 500 tons. Aside from this, pipe companies report only a scattering of routine business. We quote as follows, per net ton, Chicago:, Water pipe, 4 in., \$34.50; 6 in. and larger, \$31.50, with \$1 extra for Class A water pipe and gas pipe.

Old Material.—Further sharp advances in the prices of scrap mark the very positive trend of the market. There is not in progress a condition of marked activity attended with purchases of large quantities of scrap, but a desire on the part of most buyers to secure whatever is offered at prices the least bit favorable is readily apparent. The purchase of 1000 tons of heavy melting steel scrap at \$18 is noted. The limited quantity of scrap being offered stands in the way of any large buying without precipitating even greater advances than have been recorded. The only railroad offerings last week were 4000 tons by the Rock Island, 2300 tons by the Burlington and 800 tons by the Chicago & Eastern Illinois. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails \$22.00 to \$22.50 Relaying rails 19.50 to 20.50 Old carwheels 14.50 to 15.00 Old steel rails, rerolling 19.50 to 20.00 Old steel rails, less than 3 ft 19.50 to 20.00 Heavy melting steel scrap 17.75 to 18.25 Frogs, switches and guards, cut apart 17.75 to 18.25 Shoveling steel Steel axle turnings 9.50 to 10.00	
Per Net Ton	
Iron angles and splice bars \$22.50 to \$23.00 Iron arch bars and transoms 24.50 to 25.00 Iron arch bars and transoms 24.50 to 25.00 Iron car axles 20.00 to 20.50 Iron car axles 33.00 to 34.00 Steel car axles 33.50 to 34.00 No. 1 railroad wrought 18.00 to 18.50 No. 2 railroad wrought 17.00 to 17.50 Cut forge 17.00 to 17.50 Pipes and flues 12.75 to 13.25 No. 1 busheling 15.00 to 15.50 No. 2 busheling 15.00 to 15.50 No. 2 busheling 15.50 to 11.00 Steel knuckles and couplers 15.75 to 16.25 Steel springs 16.25 to 16.77 No. 1 boilers, cut to sheets and rings 17.75 to 16.25 Boiler punchings 15.00 to 15.50 Locomotive tires, smooth 22.75 to 23.25 Machine-shop turnings 6.00 to 6.55 Cast borings 7.25 to 7.77 No. 1 cast scrap 14.75 to 15.25 Stove plate and light cast scrap 10.75 to 11.27 Grate bars 11.25 to 11.75 Railroad malleable 12.50 to 14.05 Agricultural malleable 12.00 to 12.55 Agricultural maleable 12.00 to 12.55 Agricultural mal	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

The Minneapolis, St. Paul & Sault Ste. Marie Railroad (Soo Line) has awarded a contract to the Peppard & Fulton Company, Minneapolis, for extending its ore dock in St. Louis Bay, Superior-Duluth, at \$332,000. The extension will be 564 ft. long, 65 ft. wide, and 75 ft. high, and will have 94 pockets, each of 50 tons capacity.

Philadelphia

PHILADELPHIA, Pa., Oct. 24, 1916.

Uniformity in pig iron prices has been dissipated by the high cost of spot coke which furnace managers have been obliged to seek because of the failure of de-liveries on contract. Foundry coke, for spot shipment, is correspondingly scarce and high, and this has alarmed the foundry trade by suggesting that it may not be able to obtain deliveries of iron. In their anxiety some foundrymen have not hesitated to pay \$22.79, Philadelphia, for their favored brand. So far as there is a market level it may be said to be somewhere between \$21 and \$22, Philadelphia. Basic continues nominally around \$21.50, and there is one inquiry for 15,000 tons. coke situation is regarded as temporary by conservatives, inasmuch as the trouble seems entirely due to the shortage of cars, and this probably will be relieved with the close of navigation on the Lakes. A large maker of steel bars has put its price at 2.85c., Pittsburgh. Structural shapes are firm at 2.85c., Pittsburgh base, some of the large jobbers buying for stock at this figure. Billets are tighter than ever. Heavy sheets are stronger, No. 10 blue annealed being quoted at 2.409c., Philadelphia. The old material market has taken on a much better tone owing to strength at Pittsburgh, with active inquiry on the part of Fastern mills.

Pig Iron.—The extent to which coke producers are falling behind on contract shipments and the scarcity and high cost of spot coke, all due to the shortage of freight cars, conditions which caused some producers of pig iron to sharply advance their quotations, have created great anxiety on the part of foundrymen as to deliveries of iron. One result is that spot iron promises to become more active than it has been in the past two years. Meanwhile iron prices have grown stronger, and the situation is made more acute by a reported shortage of iron, despite the fact that stocks, though low, are no more so than they were a few weeks ago. Quotations show a much wider spread than is normal. The minimum for one brand of eastern Pennsylvania No. 2 X is unchanged at \$22, furnace, or \$22.79, Philadelphia; for another \$21.50 is the minimum, and it is questionable how much of this could be pro-One maker of Virginia iron has withdrawn from the market after failing to curtail business by advancing prices. Except for a moderate reserve he is sold up to July 1. The largest producer of Virginia iron, for delivery over the remainder of the year and first quarter, or over the first half of 1917, quotes, at furnace, as follows, all sales being subject to confirmation: No. 1 soft, \$19; No. 1 foundry, \$18.75; No. 2 X, \$18.50; No. 2 plain, \$18.25, and No. 3 foundry, \$18. These prices take a freight rate of \$2.75. Southern iron is quoted at \$16 to \$16.50, Birmingham, the minimum being equal to \$20.53, Philadelphia, but getting the iron north is a problem. Lake Superior charcoal iron is \$2 to \$2.50 higher with some makers. The minimum is about \$20.84, Buffalo, and upward according to grade. Buffalo furnaces have but little foundry to The volume of business has been good, most of the buyers wanting lots of 500 tons or under, although blocks of 1000 to 1500 tons have been placed. The Pennsylvania Railroad has closed against its recent inquiry, which called for 1000 to 2000 tons Concoke iron and 500 to 1000 tons of charcoal iron. sumers are anxious to contract for first half. Quotations are also out for the third quarter. No sales of basic are reported, but a Lebanon steel company is in the market for a lot said to be 15,000 tons. price of basic can only be considered nominal, and by deduction fixed at about \$21.50, delivered. Low phosphorus is quoted at \$40 to \$42, delivered. Eastern Bessemer ranges from \$25 to \$26, delivered. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa.	No 2 X four	idev	21 00 to	\$22.00
Eastern Pa.				
Virginia No.				
Virginia No.	2 plain		 	21.00
Gray forge .				
Basic (nomi				
Standard los				

Iron Ore.—Arrivals of foreign ore at this port in the week ended Oct. 21 consisted of 5000 tons from Cuba, 6150 tons from Spain and 4150 tons from Chile. Western Bessemer was recently sold in this district on the basis of \$5.45, Lake Erie port, an advance of 25c. over the previous price.

Ferroalloys.—Agents of English makers continue to ask \$165, seaboard, for 80 per cent ferromanganese, but domestic makers have done business at \$162, and \$160 is intimated as being possible. For prompt 50 per cent ferrosilicon, \$110 to \$115 is asked, with 11 per cent material quoted at \$36.44 to \$37.44.

Plates.—Quotations for tank plates range from 3.659c. to 4.159c., Philadelphia; for ship plates, up to 4.659c., and for marine boiler plates 6.159c. to 10.159c. Eastern shipyards are inquiring for several thousand tons, and the demand from every direction is heavy, with no prospect of early deliveries.

Bars.—A large producer has advanced its quotation for steel bars to 2.85c., Pittsburgh, or 3:009c., Philadelphia, although other interests continue to ask 2.70c., Pittsburgh, or 2.859c., Philadelphia. Despite the fact that its requirements were supposed to be covered, the Pennsylvania Railroad is in the market for 1500 to 2000 tons of steel bars for delivery over the remainder of the year. The general demand continues good. Iron bars are unchanged at 2.659c., Philadelphia, carload lots.

Structural Material.—The quotation for structural shapes is established at 2.85c., Pittsburgh, or 3.009c., Philadelphia. For one lot of 1200 tons for Western shipment, 2.85c., Eastern mill, was paid. Jobbers are stocking up, and one in New York has taken 1500 tons at the 2.85c., Pittsburgh, base. Bids will be opened to-day on 300 tons required for a building for the Packard Motor Car Company, this city. Eastern mills say that not a little tonnage on the books for fourth quarter delivery will run over into 1917. Ship shapes are quoted at 3.659c., Philadelphia.

Billets.—Even the makers of billets who have had steel to sell now announce themselves sold up well into next year. They have taken business lately at \$50 and upward for open-hearth rerolling billets, and \$65 to \$75 for forging steel.

Sheets.—The heavier gages are stronger, Eastern makers asking 3.409c., Philadelphia, for No. 10 blue annealed. The makers are not sold as far ahead in sheets as they are in other products. Export requirements form a growing part of the increased demand.

Coke.—Spot furnace coke is quoted at \$6.50 to \$7 er net ton at oven, and sales have been made at both figures. Contract furnace is nominal at \$3.75. spot market has moved upward with startling rapidity and created what is everywhere pronounced situation. The tonnage sold at the prevailing high figures is not large, but means much to furnace managers whose contract deliveries are short. One was quoted \$5.25 one day last week. He hesitated a couple of days and then had to pay \$6.50. By many the situation is declared temporary in view of the approaching close of Lake navigation. This will release a great many cars which are now engaged in carrying coal to lower Lake ports and bringing ore from them. The shortage of cars is not uniformly on all roads, some being able to find enough to carry shipments on contracts. Consumers are inclined to be bitter over the fact that they are not getting satisfactory deliveries on contracts while the coke producers are getting big prices for spot material. They declare that the production of coke has not lessened. Prompt foundry is quoted at \$6 to \$6.50 per net ton at oven also, and foundrymen are thoroughly alarmed. Contract foundry is nominal at \$3.50 to \$3.75. Freight rates from the principal producing districts follow: 0 \$2.05; Latrobe, \$1.85, and Mountain, \$1.65. Connellsville,

Old Material.—The entire market shows a better tendency based on a more active inquiry from the mills. It is noted that this market follows the Pittsburgh market more closely than formerly, and the outlook there is good. A number of items have been advanced. Quotations for delivery in buyers' yards in this district,

covering eastern Pennsylvania and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

7.550		
No. 1 heavy melting steel	\$16.00 to	\$16.50
	20.00 to	20.50
	23.00 to	24.00
Old steel axles (for export)	35.00 to	36.00
Old steel axies (for export)	35.00 to	36.00
	21.00 to	22.00
Old from rails	16.00 to	16.50
Tought wrought	22.50 to	23.00
Wrought-Iron pipe	16.00 to	16.50
No. 1 forge fire	12.00 to	12.50
No. 1 mage me	12,50 to	13.00
Bundled sheets	10.50 to	
No. 2 busheling	8.50 to	
Madagashop turnings		
The larrings	10.50 to	11.00
31- 1 1951	16.00 to	16.50
Grate bars, railroad	13.00 to	13.50
Chain Data' restraction	13.50 to	14.00
Stove plate	13.50 to	14.00
Railread malleable	T0'00 FO	77.00

Cincinnati

CINCINNATI, OHIO, Oct. 25, 1916 .- (By Wire.)

Pig Iron.-The Virginia irons were advanced \$1 today, making the furnace price on No. 2 X \$19.50. More Virginia iron has been sold in this territory lately than in any previous period. As the Watts furnace has withdrawn from the market, this makes the delivered price at Cincinnati \$21.96. Makers in southern Ohio are unable to take care of prompt orders, and quite a number of Southern furnaces have been compelled to close their order books. A runaway market is not anticipated, but the supply of iron is said by good authorities to be much below the present need of consumers. This applies to basic, foundry and malleable, and lately the Lake Superior charcoal-iron makers have withdrawn quotations. Southern No. 2 foundry is quoted at \$16, Birmingham basis, and this is now considered the minimum at which such iron can be bought. There are no quotable prices on southern Ohio foundry, malleable or basic, and the only transactions made this week were The resale iron in that to take care of old customers. district has practically been eliminated. Quite a number of near-by foundry melters who were unprotected have placed orders for lots ranging all the way from 100 to 2000 tons for first half shipment. Other users of silvery iron have bought heavily, and included in purchases are two 500-ton lots by Ohio manufacturers and one sale of 800 tons to a Michigan firm. The minimum on 8 per cent Northern silicon iron is to-day \$28 but the Jackson County producers are asking \$30. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	\$19.40 to	\$19.90
Southern coke, No. 2 f'dry and 2 soft.	18.90 to	19.40
Southern coke, No. 3 foundry	18,40 to	18.90
Southern coke, No. 4 foundry	17.90 to	
Southern gray forge	17.40 to	17.90
unio silvery, 8 per cent silicon	29.26 to	31.26
Southern Ohio coke. No. 1	22.76 te	
Southern Ohio coke, No. 2	21.76 to	22.26
Southern Onio coke, No. 3	21.26 to	
Southern Ohio malleable Bessemer	21.76 to	
Basic, Northern	21.76 to	
Lase Superior charcoal	21.20 to	
Standard Southern carwheel	24.90 to	25.40

(By Mail)

Coke.—Some 48-hr. coke, where urgently needed, has been sold as high as \$5.25 at oven in both the Connellsville and the Wise County districts, and one quotation has come to light on foundry coke as high as \$7 for this year's movement. These figures are only named to illustrate the abnormal condition now existing. Contract Connellsville 48-hr. coke ranges from \$3.25 to \$3.75 per net ton at oven, and contract foundry coke in all districts is quoted from \$3.50 to \$4, except New River, which is held around \$4.

Finished Material.—The question of good deliveries on old contracts is still a matter of great concern because of the car shortage. The local mill is quoting No. 28 black sheets at 3.90c. to 4c., and galvanized at 5.05c. to 5.15c. f.o.b. Cincinnati or Newport, Ky. While the Pittsburgh price is lower, the matter of delivery is said to be rather uncertain from several mills where prompt shipment is required. The principal effort of the nearby manufacturers is to take care of their old customers. The base price to-day quoted by mill agencies is 3.50c., Pittsburgh, on hoops and 2.85c. for bands.

Local warehouse prices are firmer, and we quote wire nails at \$2.85 per keg base and barb wire at \$3.70 per 100 lb.; steel bars and small structural shapes, 3.35c. to 3.40c.; twisted steel bars, 3.55c.; cold-rolled steel, 2-in. and larger, 3.90c.; cold-rolled shafting, 10 per cent plus the list price; No. 10 blue annealed sheets, 3.60c.

Old Material.—The market is not quite so active but prices have been advanced uniformly about 25c. per ton. The only two classes of scrap not in demand are cast borings and steel turnings, the supply of which is larger than at any time in the history of the trade and former users are not disposed to substitute this class of scrap for the heavier grades that are more easily handled. The rolling mills have lately bought heavily and the foundries have also been good purchasers. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton											
Bundled sheet scrap. \$12.25 to \$12.7 Old iron rails 18.25 to 18.7 Relaying rails 50 lb. and up 23.25 to 23.7 Rerolling steel rails 16.75 to 17.2 Heavy melting steel scrap 15.75 to 16.2 Steel rails for melting 15.25 to 15.7	5151515										
Per Net Ton											
No. 1 railroad wrought \$15.75 to \$16.2 Cast borings 4.75 to 5.2 Steel turnings 5.00 to 5.5 Railroad cast 12.75 to 13.2 No. 1 machinery cast 14.75 to 15.2 Burnt scrap 9.50 to 10.0	50550										
Iron axles	550										

Birmingham

BIRMINGHAM, ALA., Oct. 23, 1916.

Pig Iron.-Early last week the price of \$15.50 for Birmingham pig iron practically disappeared and \$16 iron began to take its place. Several interests made sales at \$16. A large amount of domestic and some foreign business offered at \$15.50 were turned down. Only one producer in the district has much capacity remaining open for the general trade, the remainder being well sold up for the rest of the year at least. Consumers are finding stocks running dangerously low and are clamoring for delivery. A leading pig-iron maker says the car shortage is cutting shipments about 35 per cent below the iron offered for movement. ports are heavy, taking place largely through Mobile, New Orleans and Galveston. One interest alone is due to ship about 20,000 tons of basic for export per month. Extreme effort is being made by railroads to relieve the car shortage and shippers are co-operating. Some relief early in November ought to become noticeable. By that time the heavy movement of Texas crops should be over and more cars available for this district. The offerings of warrant iron under \$15.50 were withdrawn early in the week and they were placed practically upon a level with furnace metal. The trend is to still higher prices. Spot iron bids fair to command a premium. Total sales for the week were from 30,000 to 50,000 tons, mostly foundry. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry	and	soft.	 		\$16.50
No. 2 foundry					
No. 3 foundry					
No. 4 foundry					
Gray forge			 	*******	15.00
Basic			 	*******	16.00
Charcoal			 	. \$22.50 to	23.00

Coal and Coke.—Coal consumers for several years have bought from hand to mouth, but, with the car shortage, they have been caught napping. They are paying higher prices and are on the anxious seat as to shipments. Steam coal easily brings \$2 as compared with contract averages of \$1.20. Contract standard beehive coke brings \$4 per net ton f.o.b. oven, and spot coke \$4.25 to \$4.50. The market is extremely active. Furnace coke is also active at \$3.25 to \$3.50.

Cast-Iron Pipe.—An order for 300 tons of pipe for an Alabama municipality is among the largest reported by the leading interest. Immediate delivery sales foot up a volume sufficient to keep production at the level of the past six months. A shipment of 1200 tons was recently made to Chile, and the leading interest is reported as seeking a portion at least of the big Buenos Ayres specifications for 65,000 tons. The South American representative of another Birmingham pipe company is also in Latin-America looking up business. Sanitary shops are doing only fairly well. We quote, per net ton, f.o.b. dealers yards, as follows: 4-in., \$29; 6-in. and upward, \$26, with \$1 added for gas pipe and special lengths.

Old Material.—The market is strong. The supply is scarcely equal to the demand, especially from small foundries and rolling mills. Dealings in cast scrap have been in heavy volume. Yard men are exerting special efforts to find material with which to meet the demand. Steel axles are eagerly sought; they bring from \$25 to \$30, and even more, if to be had in quantities. Prices are firm. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles														
Old steel rails .														
No. 1 wrought.														
No. 1 machinery														
Carwheels														
Tram carwheels														
Stove plate and	- 1	15	۲ì									. 9.2	10	9.75

Cleveland

CLEVELAND, OHIO, Oct. 24, 1916.

Iron Ore.-No change has occurred in the situation regarding next season's prices except the development of a more general sentiment among ore firms that the advance should be at least \$1 per ton. The question hinges, to a large extent, on the carrying charges, and ore firms are not inclined to name prices until these charges are established. They contend that should the carrying charges be advanced to \$1 per ton, the rate wanted by vesselmen, and ore prices are advanced \$1 per ton the ore interests will not be faring nearly so well as the vesselmen, as the net increase on ore would be only about 20c. per ton, it being estimated that the increased cost of mining due to the higher cost of labor and supplies will be 30c. per ton next season. Several small lot sales are reported for this season's delivery at a net advance of 25c. per ton over the regular price, the consumers paying the additional 50c. per ton cost for transportation charges, making the cost 75c. per ton above the regular prices for the season. However, the report is cenfirmed that the sale of 50,000 tons made recently directly by a mining company was at a net advance of 50c. per ton over this season's price. The severe storm on the Lakes last Friday caused the loss of four vessels and 54 lives and a serious delay in vessel schedules and will cut down the movement for the month. Ore boats were bunched at all Lake Erie ports early this week and some were tied up 48 hours waiting for a chance to unload their cargoes. shortage is more acute, and this is adding to delays. There is some demand for small lots of ore from the docks and furnaces are having a great deal of trouble in getting this ore as ore-handling equipment is kept busy unloading boats. All dock space has been taken. and to provide some additional space ore is being placed on the old Carnegie dock at Erie which has not been used for several years. Some vessel capacity is being offered for wild ore cargoes late in November for which there is a good demand. The barges of the Pittsburgh Steamship Company will not be sent up the Lakes after this week and many boats will take on their last contract cargoes before Nov. 20. We quote 1916 prices as follows, delivered lower Lake ports: Old range Bessemer, \$4.45; Mesaba Bessemer, \$4.20; old range non-Bessemer, \$3.75; Mesaba non-Bessemer, \$3.55.

Pig Iron.—Prices are higher on all grades and the market is fairly active, particularly in foundry iron. Some producers, however, have not kept pace with the rapid advances in prices and as a result there is a wide spread in quotations. One Cleveland interest has advanced its price to \$22 for foundry iron and reports a number of sales at \$21 and some at \$21.50, while another interest is still quoting foundry iron at \$20 at furnace and considerable business has been placed in northern Ohio territory the past few days at that price.

Some inquiry has developed for foundry iron for the last half of next year, on which \$20 has been quoted by one interest, but no sales for that delivery are reported. Sales of basic are reported at \$21, Valley furnace, and one Cleveland producer declined an offer of \$20.95 for a round lot. The sale of 1700 tons of Bes. semer iron is reported at \$26, but it is still being generally quoted at \$24. Valley quotations on foundry iron range from \$21 to \$22. The Valley price on gray forge has been advanced 50c. to \$20. A new Canton consumer has taken 3000 tons of Northern foundry iron and 1000 tons of Southern for first half delivery. Southern iron is quite active. Several sales have been made at \$15.50, Birmingham, for No. 2, but some producers that have been quoting this price have advanced their price to \$16. However, there is still some Southern iron to be had at \$15.50. Ohio silvery iron is scarce and two southern Ohio producers have advanced their price to \$30 for 8 per cent silicon. We quote, delivered Cleveland, as follows:

Bessemer				\$24.95
Basic				\$20.95 to 21.95
Northern	No. 2	foundry.		20,30 to 21 30
Southern !	No. 2	foundry.		19.50 to 20.00
Gray forg	0			20.95
Jackson C	O., SILV	ery, 8 per	cent sili	con 31.62
Standard 1	ow ph	os., Valle	Turnace	35.00

Coke.—Prices continue to advance, and standard Connellsville foundry coke is quoted at \$7 to \$8 per net ton at oven. No prices are being quoted for contracts. Connellsville furnace coke is held at \$6.50 to \$7 for prompt shipment. The sale of some Indianapolis byproduct coke is reported to a Cleveland consumer at \$6 at oven or \$7.70 delivered.

Finished Iron and Steel.—Considerable new inquiry is coming out for steel for specific work and the volume of business for early shipment is heavy. One mill has advanced its price for steel bars to 2.85c., Pittsburgh, for any delivery. An Eastern mill able to make fairly early shipments on structural material has advanced its price to 3c. Plates are very firm at 3.50c. to 4.50c., Pittsburgh. There is considerable inquiry from Lake shipyards for plates for boats of the Welland Canal size for the seaboard. Steel is wanted for these boats for second quarter delivery, but mills cannot promise shipment before the third or fourth quarter. mand for light rails from coal mines has become quite active. The sale of 3000 tons of slabs is reported by a Cleveland mill for shipment to eastern Pennsylvania at \$50. The Illinois Steel Company has taken 1500 tons of rails for the Ann Arbor Railroad. The Nickel Plate has placed the spikes and track bolts for 10,000 tons of rails. The Lima Locomotive Corporation has taken 10 locomotives for the Western Maryland Railroad, and inquiries are pending for 77 locomotives for the Northwestern and 28 locomotives for the New York, New Haven & Hartford. High-speed tool steel, which has been somewhat irregular, is now generally quoted at \$2.50 per pound, a decline of 25c. from the price long prevailing. Hard steel bars for reinforcing purposes are in heavy demand, with the price unchanged at about 2.40c., delivered. The demand for sheets is heavy, consumers being anxious to cover either for their first quarter requirements or to secure the best deliveries possible. Black sheets have sold as high as 3.75c., Ohio mill, for No. 28 and galvanized at 5.20c. for immediate We quote sheets at 3.40c. to 3.50c. for No. 28 black, 3.25c. to 3.50c. for No. 10 blue annealed, and 4.75c. to 5c. for No. 28 galvanized. Inquiry for bar iron for the last half of 1917 has come out, but local mills refuse to quote that far ahead. We quote bar iron at 2.50c. to 2.65c., Pittsburgh. Warehouse prices are 3.40c. for steel bars and structural material, 3.75c. for plates and 3.20c. for iron bars.

Bolts, Nuts and Rivets.—Railroads and implement manufacturers have come into the market with large inquiries for their bolt and nut requirements for the first half of next year, and considerable of this business is being placed at regular prices. The current demand is also active. The demand for rivets continues fairly heavy, with prices unchanged at 4c., Pittsburgh, for structural and 4.10c. for boiler rivets, for delivery in

the first quarter. Bolt and nut discounts are as follows:

Common carriage bolts, % x 6 in., smaller or shorter, rolled thread, 50 and 5; cut thread, 40, 10 and 2½; larger or longer, 43 and 2½; machine bolts within h. p. nuts, % x 4 in., smaller and shorter, rolled thread, 50 and 10; cut thread, 50; larger and longer, 40 and 5; lag bolts, gimlet or cone point, 50 and 5; square h. p. nuts, blank or tapped, \$2.70 off the list, hexagon h. p. nuts, blank or tapped, \$2.70 off; c. p. c. and t. sq. nuts, blank or tapped, \$2.40; hexagon nuts, all sizes, \$2.80 off; cold pressed semi-finished hexagon nuts, all sizes, \$60 and 5.

Old Material.—Sharp advances have been made on most grades in spite of the rather inactive market, and little material is being offered by dealers except at high prices. Sales of heavy melting steel scrap have been made at \$19.50 by Cleveland dealers for shipment to Youngstown and at \$19.20 for Canton delivery, and as high as \$19 is being asked for this grade for Cleveland delivery. Railroad malleable scrap has advanced nearly \$2 per ton. The demand from foundries for cast scrap has improved and prices on this grade and stove plate are higher. Borings and turnings continue weak. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton
Steel rails\$16.75 to \$17.25
Iron rails 19.00 to 20.00
Steel car axles 39.00 to 40.00
Heavy melting steel scrap 17.50 to 17.75
Carwheels
Relaying rails, 50 lb. and over
Agricultural management
Steel axle turnings 12.00 to 12.50
Light bundled sheet scrap 12.00 to 12.25
Per Net Ton
Iron car axles\$34.00 to \$35.00
Cast borings 6.25 to 6.50
Iron and steel turnings and drillings. 5.50 to 5.75
No 1 busheling 14.00 to 14.25
NU. I Idilioda Wicheller
NO. 1 Cast accessors and accessors and accessors
Railroad grate bars 11.00 to 11.50
Stove plate 11.00 to 11.50

St. Louis

St. Louis, Mo., Oct. 23, 1916.

Pig Iron.—The inquiry for 10,000 tons of basic iron reported last week went to Southern furnaces and another inquiry from the same source for 10,000 tons of Northern basic is pending this week, with some difficulties anticipated as to the placing of the contract, in the light of the fact that the furnaces are at present evidencing an unwillingness, according to their St. Louis representatives, to accept a large tonnage for the delivery sought on this last inquiry. The evidence seems to show that practically all of the requirements of consumers in the St. Louis territory have been well covered for the remainder of this year, and at least the first quarter of next, if not the first half. Practically no books have been opened for the last half of 1917.

Coke.—No business of importance appeared. Byproduct coke is held on a parity with Connellsville and Virginia quotations, but the local plant is well sold ahead.

Finished Iron and Steel.—There has been no activity because of the marked unwillingness of the mills to accept orders for the necessarily extended deliveries. Movement out of warehouse has been active and prices have been very firmly held at these quotations. Soft steel bars, 3.30c.; iron bars, 3.25c.; structural material, 3.30c.; tank plate, 3.80c.; No. 10 blue annealed sheets, 3.55c.; No. 28 black sheets, cold rolled, one pass, 3.80c.; No. 28 galvanized sheets, black sheet gage, 5.40c.; the last named an advance, as a result of the stiffer feeling in the zinc market.

Old Material.—The scrap market has been strong with dealers taking freely all offerings from railroads and other sources. These, however, have been limited and give evidence of a rapidly decreasing supply. Dealers are not buying to hold for future sales but this is largely due to the fact that all the material which they can get is required to fill the orders on hand. The steel mills, foundries and rolling mills are all taking materials on their contracts and are also buying in a way to indicate that their needs are becoming more acute. This is helping to hold prices and even to advance them beyond

the present high figures which have resulted chiefly from the local situation, making the St. Louis market for the present decidedly independent and free from the effects of conditions in other scrap centers. Relaying rails are wanted and more difficult than ever to get. The only railroad list coming out during the week was one for 2500 tons from the Chicago, Burlington & Quincy. We quote dealers' prices f.o.b. customers' works to St. Louis industrial district as follows:

Per Gross Ton		
Old steel rails, less than 3 ft 1 Relaying rails, standard section, sub-	9.00 to 7.50 to	19.50 18.00
	4.00 to 2.50 to	26.00 13.00
Heavy shoveling steel	7.00 to 5.25 to 7.50 to 9.25 to	17.50 15.75 18.00 9.75
Per Net Ton		
Iron car axles Steel car axles Wrought arch bars and transoms. No. 1 railroad wrought. No. 2 railroad wrought. Railroad springs Steel couplers and knuckles. Locomotive tires, 42 in. and over, smooth inside No. 1 dealers' forge Cast-iron borings No. 1 busheling No. 1 busheling No. 1 railroad cast scrap. Stove plate and light cast scrap. Railroad malleable Agricultural malleable Pipes and flues Heavy railroad sheet and tank scrap	8.25 to 8.25 to 11.00 to 11.00 to 12.50 to 11.25 to 11.25 to 12.25 to 12.25 to 12.25 to 12.25 to 15.00 to 15.00 to 15.00 to 15.00 to 15.00 to 12.50 to	16.25 31.50 33.50 21.75 17.50 16.50 16.50 22.50 15.50 7.00 15.25 11.25 11.20 11.00 11.00 11.00 12.25 11.25 1

New York

NEW YORK, Oct. 25, 1916.

Pig Iron.-Price advances are now the feature of the market and all grades and districts are participat-On Virginia iron \$19.50 was announced on Oct. 24 as the price of the leading producer for No. 2 X. Virginia irons have figured in a number of transactions, including 1000 tons to a New Jersey point. New Jersey foundry bought 1000 tons of 2.75 to 3.25 silicon Pennsylvania iron at a delivered price somewhat under \$21.50, which is exceptionally low. However, other sales from Pennsylvania furnaces have been made However, at \$21 at furnace and this also is the minimum price quoted by Buffalo furnaces for early delivery. The Buffalo group are generally well sold for the first half of 1917 and on some business recently offered have refused to quote. The Alabama market shows excitement. Warrants were quoted at \$15.75 in the latter part of last week and at \$16 early in the present week Most of the warrant iron is in strong hands and is not freely offered. New England has figured in foundry iron buying. One Connecticut interest bought about 4000 tons for first half and another 4000 to 5000 tons. Virginia iron made up a part of one of these purchases. A 1000-ton inquiry is reported from Connecticut for the last half of 1917, but few furnaces are willing to look that far forward. The export demand still has a prominent place. For export, No. 2 soft Alabama iron has sold as high as \$16 at furnace for early shipment. In the East a sale of 1000 tons of standard Bessemer for November and December delivery was made at \$24, furnace. One Eastern furnace, which it was expected would make ferromanganese, will continue on pig iron until after Jan. 1. The coke situation is more sensational, foundry coke having brought \$8 to \$8.50 at the oven, with deliveries uncertain on account of labor shortage. We quote at tidewater for early delivery: No. 1 foundry, \$22.50 to \$23; No. 2 X, \$21.50 to \$22.50; No. 2 plain, \$21 to \$21.50; Southern iron at tidewater, \$21.50 to \$22.00 for No. 1 and \$21 to \$21.50 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Sales of ferromanganese are still very few and inquiries by consumers are scarce. The opinion is expressed that buyers are holding off, expecting prices as low as \$150, seaboard, later. The present quotation for British alloy is \$164, seaboard, with the domestic product obtainable at \$160 to \$165, delivered. Reports are quite general that both the leading interest and a large Pennsylvania steel company are offering their own product at \$160, delivered, but the extent of their sales is not definitely known. While receipts from Great Britain in September were above the 1916 average, amounting to over 9000 tons, reports indicate that arrivals in October are considerably less, in all probability because of government restrictions. Spiegeleisen is quiet, with inquiries for about 1000 tons before the market. Quotations are \$43 to \$45, furnace. Ferrosilicon, 50 per cent, is still very strong, with deliveries on contract insistent and hard to meet. Dealers are not making contracts yet for 1917, but the expectation is strong that the quotation will be at \$100 or more, Pittsburgh, instead of the previous quotation of \$86 to \$88, Pittsburgh.

Finished Iron and Steel.—The week has shown no change. The principal offerings in structural steel come from the railroads, the Pennsylvania, for example, being now in the market for about 3000 tons, mainly for five bridges, with some small work in Buffalo. The insistent bombardment of inquiries for ship plates has not diminished. And generally the export demand for all lines of finished steel continues as the conspicuous factor. A lot of over 300 tons of ship plates for early delivery was closed at no less than 5c., Pittsburgh; some 4000 tons of tank plates for a domestic user, largely for the first quarter, went at 4.50c., and over 150 tons of marine steel went at 6c., Pittsburgh. noted elsewhere, it is estimated that 25,000 railroad cars will be bought in the next 30 days, and in some quarters it is believed that car builders will pay 4c. for plates next year. One of the latest inquiries is for 10,000 tons of ship plates for Norway, as soon as they can be obtained, but few mills, if any, have such plates for delivery before the second half of next year, and they are declining to quote at this time for secondhalf delivery. Boiler tubes are unusually active. Some 500 tons for delivery over seven months were sold for domestic use at about 30 per cent higher than THE IRON AGE quotation, and a late inquiry is for 6000 tons for South Africa. On the 19,300 tons of 10, 12 and 15 mm. Bessemer bars for France it is expected that 3c. will be the common price. The new shipbuilding development at Staten Island is still desirous of closing for 20,000 tons of ship plates, which it is willing to take in the second half, and it is desirous of having some protection for 1918, the requirements of which are put at 80,000 tons. We quote plain structural material at 2.70c., Pittsburgh, or 2.869, New York, for the largest lots for this year, with the price range up to 3.019c., New York, from some mills and 3.35c. from York district warehouse. We quote wide plates at 4.25c. to 4.50c. for what may be obtained prior to the third quarter of 1917; for sheared plates up to 7 ft. in width 4c. in about three months and universal plates several weeks at 3.25c. to 3.50c., Pittsburgh, the New York prices taking 0.169c. additional per pound for freight. Plates from warehouse range from 4c. to We quote steel bars at 2.60c. to 2.75c., Pittsburgh, the higher price for Bessemer steel and for rollings from shell steel discards, both of which are obtainable for relatively early shipment. We quote iron bars at 2.669c., New York. From warehouse steel bars are 3.35c. to 3.50c., New York, and iron bars, 3.25c.

Cast-Iron Pipe.—The city of Newark, N. J., will open bids Nov. 2 on about 2100 net tons of 6 to 36 in. pipe. This the only public letting of importance that has come to light in this vicinity. Private buying keeps up well. Some large consumers of pipe are now contracting for spring delivery. Prices are very strong. Carload lots of 6-in., class B and heavier, are quoted at \$31.50 per net ton, with \$1 per ton extra for class A and gas pipe.

Old Material.—Conditions continue to improve, except as to steel scrap for eastern Pennsylvania; another embargo against Coatesville has been in force for several days. A steady market is being found for steel scrap in western Pennsylvania and the iron rolling mills are frequent buyers, although not contracting far into

the future. A considerably better market than has recently been the case is now being experienced for nearly all kinds of old material. The export demand for old steel rails and axles continues good. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern		
Pennsylvania specifications)	110 0*	
Old steel mails (short lengths)	12.20 (0)	12.50
Old steel rails (short lengths) or		
equivalent	15.25 to	15.50
Relaying rails	28.50 to	29.00
Rerolling rails	19.00 to	19.50
Rerolling rails (for export)		22.50
Iron car axles (for export)	39.00 to	39.50
Steel car axles (for export)	40.00 to	
No. 1 raliroad wrought	20.25 to	40.50
Weenshit hen trought gener		20.50
Wrought-iron track scrap	17.50 to	17.75
No. 1 yard wrought, long	15.00 to	15.25
Light, iron (nominal)	3.50 to	4.00
Cast borings (clean)	8.00 to	
Machine shop turnings (nominal)	6.25 to	
Mixed borings and turnings (nominal)		6.50
Wrought pipe		
ALTONOMY TATION XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	14.25

Certain foundries appear to have a better run of business than others and are buying in somewhat larger quantities. The general foundry trade, however, is steadily buying in small lots. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

	(machinery).							
	(heavy)							

Locomotive	grate bars		 0	0 0	. 0	 	. 11.50 to 12.	0.0
	eels (nominal							
Malleable	cast (railroad)				 	. 12.00 to 12.	50

Buffalo

Buffalo, N. Y., Oct. 24, 1916.

Pig Iron.-The total of sales for the week exceeded 100,000 tons of all grades, for last quarter of 1916 and first half and last half of 1917 deliveries. Prices are rising daily. The minimum for iron in this district on rising daily. The minimum for iron in this district on the basis of No. 2 X is now \$22 at furnace, while one furnace interest is holding the remainder of its unsold product at \$25 at furnace, and is not making any effort to dispose of it. Some moderate tonnages grade high silicon iron have been sold at \$25, and one furnace has sold high silicon grades at \$26, which is the highest price reached since 1907-8. An official of one of the largest producing interests stated to-day that he would not be surprised at almost any price being attained, owing to the unprecedented situation in coke, labor, and the other elements entering into cost of production. The shortage of coke has become so pronounced that there is no telling what furnace may be liable to be put out of commission by inability to obtain an adequate supply. The margin of stocks of iron has been entirely wiped out, and melters are therefore dependent upon the current production, so that if anything should happen to cause the stoppage of their regular source of supply it would create a strained and serious situation. Some producers are so completely sold up that they are obliged to turn down large ton-nages offered, owing to the impossibility of taking on the business. A large electrical concern has this week sent out inquiries for 15,000 tons of regular grades. The quotations given below are purely nominal, although approximating the market for the different grades as closely as possible, and are for last quarter 1916 delivery and for the first half and last half of 1917, f.o.b. furnace, Buffalo:

High silicon iron	8			2 5						*		8					 		2	8			\$25.0
No. 1 foundry .	0	0		0 0											٥		 				×	*	23.0
No. 2 X foundry		0		0 0	 		a	0	0	0	0			 			 				į,		22.0
No. 2 plain	2			**		*					Ų.											v	22.1
No. 3 foundry					 																		22.
Fray forge				0	 		0				0	0	.0		0		\$ 2	1.	0	0	t	0	22.
Malleable	*	0	0	0 1	 . 0	0	0		0					6						×			22.
Basic																	2	$^{2}.$.0	0	1	0	23.
Dongomon														-		^	n.	2	a	0	4	-	0.4

Finished Iron and Steel.—Business placed is almost entirely from contract customers, with no definite deliveries promised by the mills. In order to secure delivery some users are substituting iron bars for steel. Several inquiries have appeared for steel bars and shapes for shipment over the last half of 1917 and the first quarter of 1918, but mills are averse to selling so far ahead, even against specific contracts. Most of the jobbers seem to be pretty well stocked on nails; but

there is a great scarcity of wire for manufacturing purposes. It is understood there has been very heavy covering on tin plate; mills are prorating available tonnage and it is becoming more thoroughly established that it is going to be a question of ability to supply from now on, rather than a question of price.

Old Material.—A number of good sized sales of heavy melting steel scrap have been made at above market prices, a portion being transactions between dealers to cover short orders. Indications point to an advance in the price of this commodity. Labor conditions constitute an important factor, as it is difficult for yard dealers to put material in shape on account of labor shortage. Low phosphorus billet and bloom ends show additional strength, and prices on them have advanced 50c. per ton. The entire list shows strength. Inquiries are out for large tonnages of steel, wrought and cast scrap. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel\$18,00 to \$1	8.50
Low phosphorus billet and bloom ends 22.00 to 2	2.50
No. 1 railroad wrought scrap 19.00 to 1:	9.50
No. 1 railroad and machinery cast	
	7.00
	3.00
	3.00
	6.00
	6.00
	7.50
	2.00
Clean cast borings 8.00 to	
	8.50
	2.50
	2.00
	3.50
	5.00
	2.00
	2.00
Bundled tin scrap 15.00 to 1	5.50

British Steel Market

American Billets Irregular and Lower—Pig Iron Firmer

(By Cable)

LONDON, ENGLAND, Oct. 25, 1916.

Pig iron is firm, with the output of foundry and hematite fully absorbed. Black sheets are quoted at £20 and American billets are irregular, with occasional lots of 4-in. for November shipment sold at \$63 c.i.f., while \$65 is asked for first quarter. Two-inch billets have sold at £15 10s. and special soft wire rods at £20 5s., both c.i.f. France, for immediate shipment. Tin plates are slow and stock plates are irregular at \$2s. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales,

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20 against £20 5s. last week.

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d Steel rails, export, f.o.b. works, £10 17s. 6d, Hematite pig iron, f.o.b. Tees, about 140s.

Hematite pig iron, f.o.b. Tees, about 140s. Sheet bars (Welsh) delivered at works in Swansea Valley,

Steel bars, export, f.o.b. Clyde, f18. Ferromanganese (nominal), f35. Ferrosilicon, 50 per cent, c.i.f., f27.

Permit Difficulties in Ferromanganese Shipments —Pig-Iron Exports Less

(By Mail)

LONDON, ENGLAND, Oct. 10, 1916.—There is not much change in the general outlook. The utmost is being made of the present iron and steel capacity in order to cope with the abnormally heavy requirements. Progress is satisfactory. Transport conditions have improved, as indicated by the relaxation of railroad congestion. This has facilitated the working off of some orders, but the pressure of national needs is as intense as ever.

Pig-iron continues tight, current output being quickly absorbed, with no chance of an accumulation of surplus supplies, owing to the quantities required to keep pace with running contracts for home and export account. New business in Cleveland foundry iron has

fallen off because of reduced supplies available for this and next month.

The scarcity of hematite is as pronounced as ever owing to large orders for several months ahead. The output is unequal to the demand, and the deliveries are closely supervised by the authorities. Some attempts have been made lately to secure a revision of the domestic maximum price, but in vain.

The total shipments of pig iron from the East Coast during September were only 44,969 gross tons, a decrease of about 19,000 tons from the previous month, making the aggregate for the nine months 506,365 tons, of which 490,287 tons went abroad, and only 16,078 tons coastwise. The Board of Trade returns give the total exports for September as 72,683 tons, including 7573 tons of spiegeleisen, ferromanganese and ferrosilicon, the total for the nine months at 746,681 tons being more than double the returns for the same period last year.

The scarcity of semi-finished steel is acute with Welsh bars hard to get, though the official price remains unchanged at £10 7s. 6d. Manufacturers are seriously handicapped, while importations of American material are more and more difficult. The recent expectations that the improving supply of freight room would assist the development of new business have not been fulfilled, owing to the further restriction of offers. Only a limited tonnage of 2 to 4 in. billets is now offering for November shipment at about £14, c.i.f. Liverpool, while stiff terms are quoted for January-March delivery, at about \$68 for 4-in. material. The placing of new orders for finished iron and steel for ordinary use is extremely difficult at any price, the current output being earmarked for special requirements.

Tin plates are quiet and prices have sagged further. Owing to the seriously reduced output because of the steel famine, there is no real pressure to liquidate stock plates, which remain at a big premium as compared with the terms accepted by the works against "A" certificates on the basis of about 24s. 6d. for 20 by 14. The works are required to give full details weekly of the plates rolled. Exports have decreased further.

Galvanized corrugated sheet exports fell to a new low level, only 6878 gross tons for September, making a total of 110,330 tons for the nine months, a decrease of 128,000 tons for the same period in 1915. There is no prospect of any recovery owing to the severely curtailed supply of sheet bars. Export business in black sheets is similarly hampered through steel restrictions, and American black sheets have been sold at £21 for November shipment, c.i.f. Liverpool, for standard specifications.

Ferromanganese rules quiet, shipments being for the time being restrained by permit difficulties. Indian manganese ores have ruled firm at 2s. 6d. to 2s. 8d. per unit, a little more business being reported at the higher figure c.i.f. French or United Kingdom ports.

September Imports of Ferromanganese

Imports of ferromanganese into the United States in September were 9237 gross tons, as compared with 8515 tons in August and with a monthly average of 6086 tons for the first eight months of this year. The September import statistics collected by The Iron Age include all ports except that of New York and it is understood that none of the alloy was received through that port. Of the September imports 5972 tons came through Baltimore, 1819 tons through Philadelphia, 938 tons through New Orleans and 508 tons through Norfolk, Va.

Improvements are being made by the Anniston Steel Company, Anniston, Ala., in its 19-in. and 10-in. mills. They will be equipped with electric motor drives and when the necessary machinery has been installed the 19-in. mill will have an output of about 200 tons per day. It will shortly be ready to roll rounds for delivery to the company's forge shop where shell blanks will be forged both for the market and for the connected ordnance company. The 10-in. mill will be operated on merchant material.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 b.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, 19.7c.; Physics of the property of the pr Ala., 45c. Denver, pipe, 76.1c., minimum carload 46,000 lb.; structural steel and steel bars, 83.6c., minimum carload 36,000 lb. Pacific coast (by rail only), pipe, 65c.: structural steel and steel bars, 75c., minimum carload 50,000 lb.; structural steel and steel bars, 80c., minimum carload 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.60c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in	
H-beams over 18 in	
Angles over 6 in., on one or both legs	10
Angles, 3 in. on one or both legs less than 1	
thick, as per steel bar card, Sept. 1, 1909	
Tees, structural sizes (except elevator, hand car truck and conductor rail)	05
Channels and tees, under 3 in. wide, as per	steel
bar card, Sept. 1, 1909	
Deck beams and bulb angles	30
Handrail tees	
Cutting to lengths, under 3 ft. to 2 ft. inclus	
Cutting to lengths, under 2 ft. to 1 ft. inclus	sive50
Cutting to lengths, under 1 ft	
No charge for cutting to lengths 3 ft. and over	er.

Plates.—Tank plates, 1/4 in. thick, 6 in. up to 100 in. wide, 3.50c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras	C	en	ti	8]	per lb.
Tank steel					. Base
Pressing steel (not flange steel for boilers)			. 6		10
Boiler and flange steel plates		* 1			15
"A. B. M. A." and ordinary firebox steel plates.					
Still bottom steel					
Locomotive firebox steel					

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide. B Lighter than ¼ in., to 3/16 in., up to 72 in. wide *Lighter than ¼ in., including 3/16 in., over 72 in. to 84 *Lighter than ¼ in., including 3/16 in., over 84 in. to 96 *Lighter than ¼ in., including 3/16 in., over 96 in. to 100 *Lighter than ¾ in., including 3/16 in., over 100 in. to 102 Lighter than 3/16 in., including No. 8, up to 72 in. wide *Lighter than 3/16 in., including No. 8, over 72 in. to 84 *Lighter than 3/16 in., including No. 8, over 84 in. to 96 Lighter than 3/16 in., including No. 10, up to 60 in. wide Lighter than No. 8, including No. 10, up to 60 in. wide Lighter than No. 8, including No. 10, over 60 in. to 64 Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in. Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price. Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in. Over 72 in., ordered weight 3/16 in., take No. 8 price. Over 72 in., ordered weight No. 8, take No. 10 price.	Gage Extras	
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price. Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in. Over 72 in., ordered weight 3/16 in., take No. 8 price.	Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide. I Lighter than ¼ in., to 3/16 in., up to 72 in. wide	Bas
to weight of 3/16 in., take price of 3/16 in. Over 72 in., ordered weight 3/16 in., take No. 8 price.	Over 72 in. must be ordered 1/4 in. thick on edge, or not	
	Over 72 in. wide, ordered less than 11 lb. per sq. ft., down	

$Width\ Extras$	
Over 110 in. to 115 in. inclusive	05 10 15 25 50
Length Extras	
Universal plates 90 ft, long up to 100 ft, long	05 10 20
Cutting Extras	
No charge for rectangular plates to lengths 3 ft. and over.	
Lengths under 2 ft. to 1 ft. inclusive. Lengths under 1 ft	25 50 55 30 35 40 45 50 35 80 85 85 85 85
	20

^{*}Including extra for width.

Wire Rods,-Including chain rods, \$55 to \$60.

Wire Products.—Prices to jobbers effective Oct. 19: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed,

\$2.65; galvanized, \$3.35. Galvanized barb wire and staples, \$3.55; painted, \$2.85. Wire nails, \$2.70. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Cement-coated nails, \$2.60. Woven wire fencing, 50 per cent off list for carloads, 58 off for 1000-rod lots, 57 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from Sept. 7, 1916, and on galvanized pipe from July 24, 1916, all full weight:

	Butt	Weld	
Inches Steel Blac 1/4, 1/4 and 1/4 62 1/2 66 1/4 to 3 69		Inches Black 14 and 14	Galv. 24 25 38 43
	Lap	Weld	
2 1/2 to 6	50 1/2 53 1/2 49 1/2	1 1/4	31 38 39 42 42 41
	Reamed a	nd Drifted	
1 to 3, butt 67 2, lap 61 21/2 to 6, lap 64	481/2	% to 1½, butt. 54 1¼, lap 41 1½, lap 47 2, lap 48 2½ to 4, lap 51	37 25 32 33 36
Butt W	eld, extra	strong, plain ends	
1/4, 1/4 and 3/8 58 1/2	40 1/2 50 1/2 54 1/2 55 1/2	16, 14 and 18 51 12 to 112 60	34 43 45
Lap We	eld, extra	strong, plain ends	
2 1/2 to 4 61 4 1/2 to 6 63 7 to 8 59 9 to 12 54	451/2	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	33 89 42 45 44 38

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.-Discounts on less than carloads, freight to destination added, effective from Sept. 7, 1916, are as follows:

Lap Welded Steel	Standard Charcoal Iron
1½ in	1½ in
1 % and 2 in	1% and 2 in
2 ¼ in	21/4 in
21/2 and 21/4 in	2½ and 2¾ in
and 31/4 in53	3 and 3¼ in
13/2 to 41/2 in	31/2 to 41/4 in
and 6 in	5 and 6 in
7 to 13 in	7 to 13 in

Locomotive and steamship special charcoal grades bring higher prices.
1% in., over 18 ft., and not exceeding 22 ft., 10 per cent

net extra.
2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.-Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Nos. 3 to 8	1011	OM	S,	0	U	UB	y:	8	ne	et.	, (01	- 4	6	p	61	. (ce	n	L	(I)	18	CC) U	ın	6 II	l J	U	u	ay.
Nos. 17 to 21. 3.20 to 3.30 Nos. 22 and 24 3.25 to 3.35 Nos. 25 and 26 3.30 to 3.40 No. 27 3.35 to 3.45 No. 28 3.40 to 3.50 No. 29 3.45 to 3.55 No. 30 3.55 to 3.65 Galvanized Sheets of Black Sheet Gage Nos. 10 and 11 3.75 to 3.85 Nos. 12 to 14 3.85 to 3.95 Nos. 15 and 16 4.00 to 4.10 Nos. 17 to 21 4.15 to 4.25 Nos. 22 and 24 4.30 to 4.40 Nos. 25 and 26 4.45 to 4.55 No. 27 4.60 to 4.70 No. 28 4.75 to 4.85 No. 29 4.90 to 5.00 No. 30 5.05 to 5.15 Tin Mill Black Plate Nos. 15 and 16 3.10 to 3.20 Nos. 17 to 21 3.35 to 3.65 Nos. 29 4.90 to 5.00 No. 30 5.05 to 5.15 Nos. 15 and 16 3.10 to 3.20 Nos. 25 to 27 3.25 to 3.35 Nos. 25 to 27 3.25 to 3.35 Nos. 25 to 27 3.25 to 3.35 Nos. 28 3.35 to 3.46 No. 29 3.35 to 3.45	No)S.	10	1	o	12 d	14																		00.00	15	to	3.	25 10	
Nos. 10 and 11	No No No No)S.)S.).).	22 25 27 28 29		o an an	21 d d	24																		00 00 00 00 00 00	26 25 35 40 45	to to to	00 00 00 00 00 00	40 45 55	
Nos. 15 and 16 3.10 to 3.20 Nos. 17 to 21 3.15 to 3.25 Nos. 22 to 24 3.20 to 3.30 Nos. 25 to 27 3.25 to 3.35 No. 28 3.30 to 3.40 No. 29 3.35 to 3.45 No. 29 3.35 to 3.45 No. 29 3.35 to 3.45	ZZZZZZZ	08. 08. 08. 08.	1 1 1 2 27 28 29	0 2 5 7 2 5	an to an to an	d d d	110111111111111111111111111111111111111	6.			* 1														000044444444444444444444444444444444444	.75 .85 .00 .15 .30 .45 .60 .75	to to	4.4.4.4.4.5	100	
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Metal Markets

The Week's Prices

Cer	nts Per P	ound fo	r Early	y Delive	Engl.	ton
Copper,	New York Electro-	New	New	St.	New	St.
Oct. Lake 18 28.50 19 28.50 20 28.25 21 28.25 22 28.25 24 28.50	lytic	York 40.75 41.00 41.00 41.12 1/2 41.25	York 7.00 7.00 7.00 7.00 7.00 7.00	Louis 6.92½ 6.92½ 6.92½ 6.92½ 6.92½	York 9.55 9.67 9.67 10.00 10.25 10.25	Louis 9.30 9.50 9.50 9.75 10.00 10.00
87.1		A.Y.	Trai	nee Old	OF 40	15.25

NEW YORK, Oct. 25, 1916.

Copper is quiet, but its undertone shows a stronger tendency. Lead has been active and the St. Louis quotation is stronger. Spelter has advanced during active buying of galvanizing grades. Tin has been quiet, but nevertheless the market is higher. Antimony is dull again.

New York

Copper .-- Not much business is reported, but the undertone of the market is stronger. There is a persistent rumor that a large lot for export shipment is under negotiation, and it is believed that Italy is the prospective buyer. November electrolytic can be had at 28.50c., December at 28c., January at 27.50c., first quarter at 27.25c. to 27.37 1/2c., and first half at 27c. A sale involving special considerations was made for first quar-The Lake producers are reported to be sold up to next March, for which delivery they quote 27.371/2c. Some small foreign inquiry has come to light in the past few days, but most of it is for prompt deliveries and it therefore does not greatly interest the producers, as practically the only spot metal to be had is in second hands. The products business, both brass and copper, is heavier than at any time heretofore. Copper rings for shells are in great demand, but none of the mills can take any further orders. Were it possible for them to do so they could get orders for millions of rings. The London market for spot yesterday was £144, against £143 a week ago. The exports this month, including yesterday, total 21,681 tons. Those of nine months of this year total 245,002 tons, against 186,663 tons in the same period of 1915.

Tin.—The market is strong, notwithstanding the fact that business has not been heavy since last report. Quotations yesterday were higher at 41.25c. for spot Straits, with spot Banca at 40.87½c. to 41c. In the latter part of last week buying was steady, though moderate. On Monday the market was dull, with second-hands inclined to grant concessions. Yesterday the market was fairly active, with most of the demand for futures. Sales of Banca have been confined to small lots. The arrivals this month total 2005 tons, and in this connection it is noted that permits to ship from London are again tighter. Afloat there is 2025 tons.

Lead.—Throughout the week lead for delivery at Eastern points was obtainable at 7c., New York, which is the quotation of the leading interest. Until about the middle of last week independents quoted 6.85c., St. Louis, but this price was withdrawn following sales of large quantities of chemical lead, after which the Western quotation went to 6.92½c., the level at which the principal producer quotes. Chemical lead, it is explained, is not suitable to many purposes, but is used for acid tanks, pipes, cable coverings, etc. It is not used in solder and other alloys. A good business has been done in all grades, much of it for export to Canada and other countries. For strictly spot lead, dealers have asked up to 7.20c., New York. The trade is puzzled over a report that the leading producer has also been a buyer in the past week. The London quotation of yesterday was unchanged at £30 10s., as compared with a week previous. The exports this month, including yesterday, total 2871 tons.

Spelter.—In the past four or five days a heavy business has been done, principally in galvanizing grades, and prices have advanced. The quotation for spot yes-

terday was 10.25c., New York, and 10c., St. Louis. Sellers were disappointed because the advancing tendency appeared to have halted yesterday, although the market was left strong. November is quoted at 10.12½c., New York, and first quarter at 9.87½c. to 10c. The London spot quotation yesterday was £1 higher than a week ago, at £54. Exports continue extremely large, amounting this month, including yesterday, to 7027 tons.

Antimony.—After good buying, especially by Canadian interests, the market has turned quiet again. Business was placed around 11.75c. in bond and 13c. to 13.50c. duty paid.

Aluminum.—No. 1 virgin metal, 98 to 99 per cent pure, ranges from 64c. to 66c.

Old Metals.—The market is again advancing. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	27.00 to 27.25
Copper, heavy and wire	
Copper, light and bottoms	22.50 to 23.00
Brass, heavy	
Brass, light	12.00 10 12.50
Heavy machine composition	
No. 1 yellow rod brass turnings	
No. 1 red brass or composition turnings.	
Lead, heavy	6.625
Lead, tea	
Zine	7 50 to 8 00

Chicago

Oct. 23.—The strength of the copper market is shown in the stiffer quotations for spot shipment and the scarcity of metal, particularly electrolytic, for early delivery. Tin prices have recovered from a temporary slump and spelter is again above 10c. We quote: Casting copper, 27.50c.; Lake copper, 28.50c. to 29c.; tin, carloads, 42c. and small lots, 44c.; lead, 6.95c.; spelter, 10.15c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 14.50c. to 15c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 24c.; copper bottoms, 21c.; copper clips, 23c.; red brass, 194c.; yellow brass, 15c.; lead pipe, 6c.; zinc, 74c.; pewter, No. 1, 25c.; tinfoil, 30c.; block tin pipe, 35c.

St. Louis

OCT. 23.—Metals were firmly held all the week, with lead in especially good demand. Closing quotations on carload lots to-day were: Lead, 6.90c. bid, with no sellers; spelter, 9.50c. to 9.75c., with no sellers at those prices; tin, 42c.; Lake copper, 29c.; electrolytic copper, 28.75c.; antimony, 14c. In the Joplin ore district \$70 remained the top price per ton for choice zinc blende, while for basic ore the range was \$65 to \$70, with the average for the week \$67.50. Calamine was steady at \$35 to \$45, with an average for the district of \$41. Lead ore, in good demand, brought as high as \$87, with the average for the week \$85. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 9c.; heavy yellow brass, 12c.; heavy red brass and light copper, 17c.; heavy copper and copper wire, 19c.; zinc, 6c.; lead, 5c.; tea lead, 3.50c.; pewter, 25c.; tinfoil, 31c.

Our foreign trade statistics for September show that both exports of merchandise and the excess of exports over imports have surpassed all previous monthly figures. The total of merchandise exports for September was \$512,847,957, about \$3,000,000 more than in August. Imports of merchandise, on the contrary, fell off considerably, being \$164,128,604, which was \$35,000,000 less than in August and \$82,000,000 less than in June, which was the record month of this year. The excess of exports over imports was \$348,719,343, which is \$200,000,000 larger than in the same month last year. For the 12 months ended with September the trade balance in our favor was \$2,664,179,316. Net receipts of gold for the month amounted to \$85,713,799, and for the 12 months reached a total of \$456,032,344.

The Reliance Iron & Coke Company, Cincinnati, has opened an office in room 1742, Frick Annex, Pittsburgh, in charge of R. S. Fox, who has been connected with its Cincinnati offices for about three years and prior to that was with Walter-Wallingford & Co. in their Chicago and Pittsburgh offices.

Farm Implement Manufacturers Meet

Industry Suffering from War Conditions But Great Opportunities for the Future Are Forecasted — Government Attitude Reassuring

The twenty-third annual convention of the National Implement and Vehicle Association, Atlantic City, Oct. 18, 19 and 20, was attended by about 250 manufacturers and others connected with the agricultural machinery equipment industry and representatives of firms which serve the industry. It was accounted one of the largest and most successful conventions the association has held. The farm implement industry has been hard hit by the war, and naturally there was not the amount of optimism over immediate prospects that has been in evidence at recent trade gatherings in other lines, but that great opportunities will present them-selves when peace comes was conceded. The high cost of materials was a delicate subject with most of the manufacturers; as one speaker expressed it-a subject too disagreeable for discussion.

The convention was called to order in the Hotel Traymore by J. F. Donahue, Russell, Burdsall & Ward Bolt & Nut Company, Chicago, president of the auxiliary membership of the association, who made the address of welcome, to which Capt. C. F. Huhlein, Louis-

ville, Ky., responded.

FARMERS STILL WANT HUGE CREDIT

A. J. Brosseau, Gale Mfg. Company, Albion, Mich., president of the association, in his address, laid stress on the fact that implement manufacturers extend enorcredit to the farmers of the country, probably \$100,000,000 of which is unnecessary. In contradistinction to this condition he declared that the average farmer is willing and anxious to pay cash for his automobile. He declared that the terms prevailing to-day in many cases were those of the pioneer days of the in-dustry, 30 or 40 years ago. The experience of the past year with the implement manufacturers has been directly opposite to that of most industries, but he saw hope for the future in the co-operation of the Federal Trade Commission, legislation like the Webb bill and the growing tendency of the Government to allow manufacturers to co-operate, especially with regard to export trade.

Secretary and General Manager E. W. McCullough reported that forty meetings of committees and departments of the association had been held in the year, most of them at the home office at Chicago. Early in the year departments had been created, each composed of members in one line or commodity, and great benefit

had resulted.

Referring to educational books and pamphlets, Mr. McCullough said that the association had in the year minted and circulated 100,000 copies. He said: "One of these, 'Turning Your Capital,' explaining the law, the methods and the use of the note-discounting privilege, given under a special ruling of the Federal Re-serve Board, and relating to paper taken for 'agricultural purposes' is a masterpiece of simplicity, and dis-tribution to the banks, dealers, traveling salesmen and others interested is and will continue to be an invaluable aid to the shortening of terms and the improving of the retailer's business methods."

MAIL-ORDER COMPETITION AGGRESSIVE

He said the association was in good standing with all Government agencies with which it came in contact. He suggested that the members should take the retailers in their confidence and explain to them the difficulties encountered in manufacturing and distributing. He also said that several forms of selling competition should be given more attention. Of mail order distribution, he said: "While we have believed our line to be immune to a very great extent, the fallacy of this conclusion will be revealed by even a casual investigation."
In conclusion, he said: "Government agencies and

commissions are realizing that there can be no collu-

sion or detrimental co-operation in such an organiza. tion as ours, comprehending a membership so strongly They are also appreciating that great competitive. economic waste which has been going on for many years, through the unintelligent competition of manufacturers in various lines, and to-day they are viewing with a sympathetic eye the efforts being made toward better conditions.

C. E. More, Chicago, attorney to the association, urged the necessity for closely watching legislation.

He said:
"There are now pending before the Federal Supreme Court many important cases which must be disposed of at an early date. The decision of these cases, one way or the other, might materially affect business. However, one gathers a very strong impression from reading the decisions of the higher courts that it is not their disposition to tear down any legitimate business, but so to construe the law that no violence will be done. The rule of reason is becoming more and more applicable."

W. H. Stackhouse, French & Hecht, Springfield, Ohio, chairman of the Committee on National Legislation, in his report, soundly rapped the Adamson 8-hr.

HOW COSTS ARE GOING UP

The Thursday morning session opened with an address by G. W. Mixter, Deere & Co., Moline, Ill., entitled "Operating Value of Cost Systems," a part of which appears in another part of this issue of THE IRON AGE. Mr. Mixter and his company were highly praised for his frank exposition of the subject, which was illustrated by numerous lantern slides. An interesting diagram, projected on the screen, illustrated the comparative total cost of manufacturing of a typical farm implement with steel at 1.20c., 1.90c. and 2.60c., with business normal and reduced 25 per cent, the figures being based on actual facts. They follow:

	Steel at 1.20c. Normal Volume	Steel at 1.90c, Normal Volume	Steel at 1.90c. Volume Reduced 25 Per Cent	Steel at 2.60c. Normal Volume	Steel at 2.60c. Volume Reduced 25 Per Cent
Total cost of manufacturing Facturing Labor Increase Per cent	\$2.01 1.17 0.33	\$2.72 1.82 0.33 0.71 35	\$2.85 1.82 0.33 0.84 41	\$3,24 2,34 0,33 1,23 61	\$3.37 2.34 0.33 1.36 68

H. J. Hirshheimer, La Crosse Plow Company, La Crosse, Wis., chairman of the Committee on Manufacturing Costs with Uniform Cost System, presented a lengthy report on a uniform accounting system which the committee had devised, and to which informal approval had been given by a member of the Federal Trade Commission. Several members urged the adoption of a uniform system, and it was maintained that there was no potent reason why manufacturers should not compare costs. The question was one, however, on which the legal department of the Government has yet to give a ruling. A majority of those present expressed willingness to co-operate, and the report was referred to the executive committee of the association with power to act.

At the Thursday afternoon session Dr. E. E. Pratt, chief of the Bureau of Foreign and Domestic Commerce, gave an address, beginning with an analysis of export figures, and dwelling in particular on the enormal of the contract of the contr mous recent growth in exports. He believed that implement manufacturers could profitably turn their attention to the manufacture of machinery for the harvesting of crops not raised in this country, such as

rubber, cocon, rice, coffee, tea, etc. He believed that a substitute for the Webb bill, which did not get through the Senate, and which proposed that manufacturers could combine to promote export trade, is inevitable. It is his belief that when the war comes to an end the great producing countries of the world will find themselves without an adequate supply of farm-operating

The remainder of the Thursday afternoon session, and all of Friday morning, were devoted to topics of special interest to the agricultural implement trade. The annual banquet was held Friday evening.

The following resolution, indorsing the settlement of industrial disputes by arbitration was adopted:

In consideration of the welfare of the country at large, as well as of the best interests of the vast number of our citizens who are engaged in agricultural, commercial and industrial pursuits in whatsoever capacity, the prosperity of which is so largely contingent upon the continued successful operation of the railroads and other great public utilities, we hereby unqualifiedly indorse the eminently practical American method of referring for settlement all industrial disputes involving such utilities to a non-political board of arbitration.

The following resolution dealing with the subject of an American merchant marine was passed:

We recommend and urge the Congress of the United States to enact such legislation as will encourage and assist private capital to build and successfully operate and maintain an American merchant marine to the end that American manufacturers may maintain and increase their present foreign trade free from restrictions and limitations that the great ommercial nations of Europe may impose upon their respective merchant marines in their commerce with the present neutral and belligerent countries.

At the final business session the following were elected officers for 1916-1917:

OFFICERS FOR 1916-1917

President, Joseph Dain, Deere & Co., Moline, Ill. Chairman of Executive Committee, C. S. Brantingham, Emerson-Brantingham Company, Rockford, Ill. Secretary and general manager, E. W. McCullough, West Monroe Street, Chicago.

Executive Committee: H. M. Wellis, I. J. Case

of

Executive Committee: H. M. Wallis, J. I. Case
Plow Works, Racine, Wis.; G. A. Ranney, International Harvester Company, Chicago; P. E. Herschel,
R. Herschel Mfg. Company, Peoria, Ill.; G. R. James,
James & Graham Wagon Company, Memphis, Tenn.;
W. H. Stackhouse, French & Hecht, Springfield, Ohio;
A. B. McLean, Roderick Lean Mfg. Company, Mansfield Ohio; William Black, R. F. Avery & Sons, Louise, field, Ohio; William Black, B. F. Avery & Sons, Louisville, Ky.; H. N. Wade, U. S. Wind Engine & Pump Company, Batavia, Ill.; J. B. Bartholomew, Avery Company, Peoria, Ill.; H. J. Hirschheimer, La Crosse Plow Company, La Crosse, Wis., and George N. Peek, Deere & Co., Moline, Ill.

The vice-presidents are as follows: A. B. Thielens, Studebaker Corporation, South Bend, Ind.; G. P. Alexander, Aultman & Taylor Machinery Company, Mansfield, Ohio; Bradford Brenton, Grand Detour Plow Company, Dixon, Ill.; Clyde L. King, Atlanta Plow Company, Atlanta, Ga.; C. M. Burdette, Sharples Separator Company, West Chester, Pa.; H. C. McCartney, Bull Tractor Company, Minneapolis, Minn.; W. James, James Mfg. Company, Fort Atkinson, Wis.; E. A. Maytag, Maytag Company, Newton, Iowa; H. W. Hudson, Walter A. Wood Mowing & Reaping Machine Company, Hoosick Falls, N. Y.; Frank Bateman, Bateman Mfg. Company, Grenloch, N. J.; C. B. Dempster, Dempster Mill Mfg. Company, Beatrice, Neb., and James R. Ranken, Henderson Wagon Works, Henderson Ky. son, Ky.

The American Rolling Mill Company, Middletown, Ohio, has let a contract for extensive additions to its East Side plant. Four open-hearth furnaces will be installed, and the building housing this department will be more than doubled in size. All the auxiliaries, such as cranes, ingot buggies, charging machines, etc., will be added. An additional soaking pit is also under construction. In the power plant a new 4500-kw. Westinghouse mixed flow turbine will be installed.

MACHINE TOOL BUILDERS

Opening Session of Convention at Hotel Astor, New York, Tuesday, Oct. 24

"We might picture business in America as a great forge made white hot, as the demand from Europe has blown upon it like a mighty bellows. The anvils have rung, the workers have toiled, and still the cry has been for more, more. But this Hercules of war will grow weary. The giant bellows will lose its force. Will there then be a sufficient demand to keep all busy? America wants and needs all the prosperity it can get, so in the midst of unprecedented prosperity let us not forget to prepare for other days. We represent an industry that is fundamental in the world-more fundamental to-day than ever before. We manufacture the mechanism which keeps men always at the topmost point of civilized development. It is an honor to be a machine-tool builder. It is more than an honor-it is a national responsibility, as it never was before, that the machine-tool builders of America should be the builders of the best machine tools."

In these words President J. B. Doan sounded the keynote of the annual meeting of the National Machine Tool Builders' Association at the Hotel Astor, New York, Oct. 24 and 25. The registration for the first day was 140, thoroughly representative of the machinetool industry. The work of that day consisted largely in the appointment of committees and in sectional committee meetings. A nominating committee consisting of P. G. March, F. H. Brown and O. B. Illes was appointed to bring in the names of officers to be voted upon in the closing session of the convention. Other committees appointed were an auditing committee composed of Wallace Carroll, Fred Eberhardt and George High; a resolutions committee-William Lodge, C. H. Norton and J. N. Heald; a convention committee to select the next meeting place-Fred Geier, B. B. Quiller and E. T. Clary. One of the most interesting features of the day was an address by Frank F. Dresser, Worcester, Mass., on the subject of "Health Insurance." This address and the president's address will be reviewed more fully in the next issue of THE IRON AGE.

Standard Shipbuilding Corporation to Expand

Jose Marimon, president Banco Espanol, Havana, Cuba, has acquired control of the Standard Shipbuilding Corporation, 44 Whitehall Street, New York City. It is the intention of the new management to expend about \$2,000,000 in developing the plant at Shooters Island, N. Y. New slips and power houses will be built to increase the capacity of the yard to 16 ships. A considerable portion of this expenditure will be for equipment, including machine and pneumatic tools, cranes, plate bending rolls, punching and shearing machines, hydraulic presses, etc. Orders for a portion of this equipment have already been placed. At the present time six steamers for foreign delivery are being built at the plant, each of which requires approximately 3000 tons of steel. The first of these steamers is to be delivered about December. The officers of the company are Jose Marimon, president; Wallace Downey, first vice-president and general manager; W. R. Bush, second vice-president, and Henry W. Baird, secretary and treasurer.

The first meeting of the season of the Providence Engineering Society took the form of a house warming of its new quarters at 29 Waterman Street, Providence, R. I. It has leased the entire second floor of the building and has had the rooms remodeled to suit its needs.

The Gage Structural Steel Company, Chicago, announces that its new plant at 3123 South Hoyne Avenue has been completed. With the much larger equipment installed, the company now has facilities for a much larger business.

Machinery Dealers Meet in New York

Danger of Second-hand Offerings -Builders Must Give the Dealers Right Prices to Combat New and Cheap Tools

ANY questions owing their existence to present abnormal conditions were discussed at the fall meeting of the National Supply and Machinery Dealers' Association, Oct. 24, at the Hotel Astor, New York. Throughout the two sessions there was expressed a strong sense of the need of being alert to changes that will come with the end of the war. in attendance were members of the association who sell machine tools, and their gathering was the one usual with the convention of the National Machine Tool Builders' Association. The dealers were called to order by President H. W. Strong, Strong, Carlisle & Hammond Company, Cleveland, Ohio, who gave way to Vice-president W. J. Radcliffe, E. A. Kinsey Company, Cincinnati, Ohio, in charge of the association's machine tool interests

Mr. Radcliffe said that there now exist probably 100 more manufacturers of machine tools than there two years ago. Many who are making lathes and tools especially for the manufacture of war munitions will

discontinue when the emergency passes.

George Cherrington, Brown & Zortman Machinery Company, Pittsburgh, asked if it were not time for plans for curtailing operating expenses, in their increase of the past two years, provided there can be reduction without impairment of efficiency. Incidentally he noted that some manufacturers have reduced their cash discount from 2 to 1 per cent, while others have eliminated the discount.

HENRY PRENTISS ON GENERAL SITUATION

Henry Prentiss, Henry Prentiss Company, Inc., said:

It is now nearly two years since we commenced to feel impetus of the demand for machine tools growing out of the needs of the European war, which continued in increasing volume until we felt the culmination had been reached a year ago: yet in spite of the seeming insurmountable ob-stacles, abnormal prices and long deferred deliveries, orders are still coming in in unabated volume and are likely to continue until the end of the war, a problem no one now is able to solve. It is true the earlier demand for certain single purpose tools required for the manufacture of shells, largely supplied by manufacturers not regularly in the machine tool line, has abated so that some of these manufacturers have stopped operations. This situation also applies to the cheaper stopped operations. This situation also applies to the cheaper grade of tools not so well known as the standard makes. The market for standard tools, however, has not been affected and is not likely to be under prevailing conditions. The demand for such tools is still strong, well distributed and shows no signs of falling off. We find that well established representative concerns are frequent buyers, and lished representative concerns are frequent buyers, and, while orders are not so large, they are more in number cover a more varied line with the total volume undiminished.

In this connection it would seem wise to urge upon the

attention of our manufacturers the necessity of great care to maintain the former standard of high quality in their products, which is no easy task in view of the scarcity of good materials and efficient labor. We should bear in mind that the most important and valuable commodity we can offer our patrons is service; under present conditions intel-ligent thought and tireless effort are required to keep a stock of service on tap; expanding prices, far off deliveries and scant equivalent in values because of inferior materials and

workmanship render this most difficult.

Many competent judges unite in the conviction that the end of the war will be followed by a sharp depression resulting in receding prices, for a longer or shorter period, and that a readjustment of financial, commercial and manufac turing conditions must precede a return to normal condi-As our country has accumulated vast resources, the fruitage of the great prosperity of the past two years, the consequent demand upon them, together with the growing needs of our railroads and shipbuilding plants to supply adequate transit facilities on land and water, for our expanding domestic and foreign trade, should be important fac-tors in restoring prosperity, should this prediction prove true. While the great volume of munitions business will cease,

it is reasonable to believe that it will be succeeded by increased trade with South America and the war ravaged countries of Europe. The latter will require our labor say, ing machines to replace cheap hand labor, which will be scarce because of the war's destructive activities.

Conservative Policy Suggested

In view of the possibility of an early peace it is incumbent upon us to pursue a conservative policy in our business operations, that we may neither be embarrassed nor burdened by a sudden adverse change in the business situation Let us remember the basis of our present business activities is not a constructive rock but the shifting sands of adversity. This is not a note of discouragement but rather of warning to be mindful of the causes underlying our present good times.

In discussing the question as to the problems which will confront the machinery dealers after business conditions become normal the statement was made that \$750,000 worth of second-hand machinery will be placed on the market within 30 days in the Pittsburgh district by firms which are now completing munitions contracts. The member said that under these conditions "safety first" was a good slogan, and that under these circumstances he would go slowly in acquiring stock.

Another member said that about eight months ago

there was a temporary lull in the Cleveland market which was a source of worriment because of the stock on hand, but that it quickly disappeared with the re-vival in demand. With regard to the future this member thought that dealers should not buy heavily into the future unless the manufacturers agree to stand back of them in the matter of prices. He pointed out that many manufacturers will have to run fully a year before they can assemble the stock they had on hand in August, 1914. The statement was made that practi-cally all consumers would prefer new machines to second-hand, and that the movement of the former was largely up to the manufacturer inasmuch as it was largely a question of price.

PATH OF NEW MAKERS NOT EASY

L. J. Hammond, Strong, Carlisle & Hammond Company, Cleveland, in a letter, gave it as his opinion that a great many of the machinery dealers are unnecessarily annoyed by the unusual conditions now existing. He wrote: "It is true that there are several new manufacturers of machine tools, but it is equally true that there are a number of new selling agencies. * * *
The unusual conditions referred to are in themselves working a hardship on the new companies. it very difficult to get satisfactory equipment, and even more difficult to work up a satisfactory organization, with the result that they have so far, very few of them, been able to turn out a satisfactory product or one that could actually be regarded as competitive. Some few of them will continue to improve and ultimately be a success, but it is my opinion that the majority of them will fall by the wayside."

On the question as to what are the real relations between the manufacturer and the dealer, the consensus of opinion was that the dealer is at once both general merchant and manufacturer's agent, the latter when he controlled a product in a given territory. Charles S. Farquhar, Chandler & Farquhar, Boston, Charles S. Mass., said that the agent should practice loyalty to the

fullest extent.

Discussion was had on the question as to whether the dealer's position was weakened by the entrance of his customers into large corporations which might consolidate the purchasing of a number of companies in the hands of a few purchasing agents, with a consequent possibility of the machine-tool builder seeking to sell to the large company through special representatives. In speaking to the question, W. T. Todd, Somers, Fitler & Todd Company, Pittsburgh, said he knew of no district which could boast of more consolidations of the kind referred to than Pittsburgh, but that it had simply enabled the dealers to receive orders heretofore unmatched as to size. They had the further effect of raising some concerns from the retail into the jobbing

President Strong said he believed the consolidations worked both ways. They had increased sales in some directions, but other business had been lost because of the removal of purchasing offices. Ten years ago the automobile industry was new and unorganized with the result that its buying was loosely done, a fault which had been corrected.

The statement was made that most large concerns were willing to do business with the dealer, but Vicepresident Radcliffe said he had heard of some large corporations which showed a tendency to deal directly with the manufacturer. Henry Prentiss said that the latter contingency showed the wisdom of having exclusive agency arrangements with the manufacturer, in which event the dealer was protected.

The question was raised as to how far manufacturers might have disregarded the dealers' position and given preference in deliveries to other purchasers, because of bonuses or other consideration, but it was agreed that little or none of this unfair preference had been shown. One case was mentioned where a manufacturer had favored a customer, but it was solely on the plea of the customer that he was in dire need and no bonus was involved.

BUT LITTLE HARM FROM CANCELLATIONS

It was brought out that, as a rule, there had been adherence to the practice of taking orders not subject to cancellation, but most of the members said that where cancellation had been allowed the machines taken back had been resold at an increased profit. George Vonnegut, Vonnegut Hardware Company, Indianapolis, Ind., said that in one case his firm had found it necessary to accept cancellation because their customer was likely to become a competitor by selling the tools. He said that conditions differed, and that fairness should rule. Henry Prentiss said his company had had no trouble with cancellations and that where the necessity arose they were granted, as it was better to avoid friction, although where large orders were involved his company made it extremely emphatic that the contracts could not be cancelled, and in cases had exacted a deposit as evidence of good faith.

At this point the question was raised as to what course should be followed when peace is declared—whether cancellations should be permitted or some form of contract devised which would impose a penalty for non-performance. The danger of carrying an overstock at that time was referred to also.

President Strong spoke of a letter which had been sent to customers of his house, which reviewed conditions, referred to the machines which the customer had on order and stated that if cancelled at a later date a charge of 25 per cent would be imposed. Of those addressed only two sent discordant replies. Mr. Strong said that the 25 per cent clause was placed in the letter more to obtain earnest consideration of the letter and the customers' actual requirements than with any idea of enforcement. In this connection another part of Mr. Hammond's letter was read, in which he said:

It is not many years ago that even a formal stock order was not considered as even a firm order or as having any true value, being subject to cancellation with hesitation at the will of the dealer or even the manufacturer. The wholesale cancelling of orders in 1908 created a good deal of feeling and a number of the manufacturers repeatedly expressed regret that such a condition was permissible. I am confident, however, that if the non-cancellation clause had been rigidly enforced in 1908 it would have more than doubled the number of failures both with the dealers and with the manufacturers who were the dealers' heavy customers.

It has always been my opinion that the non-cancellation clause should not become effective until the work in the factory has advanced to such a point that the fact of cancelling would cause a loss to the manufacturer.

Plea for the Honest Buyer

If an extreme and unusual change in business affairs occurs, I do not see how it is reasonable to expect that orders for new equipment would not be cancelled, nor am I prepared to say that the loss would not be fully as great, all conditions considered, in case everyone should rigidly enforce the non-cancellation clause. I do think the manufacturer should be reimbursed for any expense that he may have been actually put to toward the completion of any order, but I also think that as long as the manufacturer and dealer are convinced that a person is acting in good faith he should not be penalized for trying to anticipate his legitimate requirements, particularly when the machinery market is in such a chaotic condition that he cannot duplicate such machines as he has installed within a period of anywhere from four months to a year.

It is very seldom that an agency proves to have a real value until a basis of intimacy and undivided confidence is established with the manufacturer to such an extent that the manufacturer regards the agent as an actual part of his organization. When this condition has been established, the manufacturer in extending the dealer a courtesy is to no small degree simply extending it to himself or to his own interests. In a lesser degree this same feeling must exist between the dealer and his customer.

Mr. Hammond's views were given hearty applause.
Mr. Farquhar 'again raised the question of post
bellum possibilities, with particular reference to the attitude of manufacturers and dealers. What, he asked,
will become of the special tools which have come on
the market since the war started, some of the manufacturers of which have fitted themselves to turn out
machines in large numbers and on good terms. He
asked if they would become competitors of the older
manufacturers. They exist because the regular manufacturers cannot supply the demand.

Vice-president Radcliffe believed that the situation will eventually get back to its old status, largely because standard makes of tools are well known and need no missionary work. One member said he knew of companies in Cincinnati, now engaged in war business, who already were figuring on what they would build in the tool line after the declaration of peace, and that it was not improbable that they would be competitors of those for whom they are now making machines. Another member said that under such conditions it was incumbent on manufacturers to see that their prices were not too high when the crisis comes, and that it was the disposition of dealers to meet the views of manufacturers provided the prices fixed by the latter are right. That the manufacturers are giving serious thought to the subject was admitted.

PRICES PLAY A LARGE PART

Reference was made to the advisability of a cut in prices at the psychological moment with a view of starting buying, but the point was made that when the builders of standard machines lowered their prices there would be cutting also by the makers of newer and cheaper machines. Incidentally it was brought out that at least one manufacturer was contemplating a further advance. A member said he knew of four new lathe builders, but only one intended to remain in the business permanently.

Secretary-Treasurer Thomas A. Fernley, in his report, touched on matters which had occupied the attention of the officers in the year, and in part said:

One of the interesting questions discussed during the year, was that of whether the dealer's contract with the manufacturer should be an oral or written one. The preponderance of opinion seemed to be in favor of a definite written contract clearly setting forth the various terms upon which the dealer assumes the work of distributing. You are aware of the fact that the association adopted a uniform contract some years ago.

The Republic Iron & Steel Company has opened an office in Boston in the John Hancock Building, Devonshire Street. William H. Hunter, who has been traveling in the Boston territory for the New York office, will remain as the Boston representative of the company.

Iron and Industrial Stocks

New York, Oct. 25, 1916.

The strength of the stock market has been well sustained, with some securities realizing new high records. United States Steel common sold up to 121%, selling higher than the preferred for a brief period. Practihigher than the preferred for a brief period. cally every stock in the list showed a marked advance during the week. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

		Allis-Chal., com. 25 - 26 % Allis-Chal., pref. 80 ½ - 81 % Alm. Can, com. 60 ¼ - 63 % Am. Can, pref. 113 - 115 Am. Car & Fdy., com 66 % - 70 ¼ Am. Car & Fdy., pref 117½ - 119 Am. Loco, com. 78 % - 83 % Am. Loco, pref. 105 % - 107 Am. Rad., com. 400 - 404 Am. Ship, com. 57 - 59 Am. Ship, pref. 92 - 92 ½ Am. Ship, pref. 92 - 92 ½ Am. Steel Fdries 61 - 64 ½ Bald. Loco, pref. 108 - 109 Beth. Steel, com. 549 - 629 Beth. Steel, com. 549 - 629 Beth. Steel, pref. 136 ¼ Carbon Stl., com. 92 - 92 % Carbon Stl., com. 92 - 92 % Carbon Stl., com. 13 - 15 ½ Carbin Stl., com. 13 - 15 ½ Carbin Steel. 124 % - 145 Cas (J. I.), pref 86 Central Fdry., com 13 - 15 ½ Central Fdry., pref 28 - 29 % Chic. Pneu. Tool. 72 ½ - 73 % Colo. Fuel 53 % - 56 ½ Cruc. Steel, com. 84 ¼ - 90 ¼ Cruc. Steel, pref. 121 - 123 Deere & Co., pref. 95 - 96 Driggs-Seabury 87 - 90 Gen. Electric 180 ¼ - 45 ½ Gt. No. Ore Cert. 42 ½ - 45 ½	Harb-Walk, Refrac., com
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Dividends Declared

The Crucible Steel Company of America, 2 per cent on account of back dividends on the preferred stock, payable

The De Long Hook & Eye Company, regular quarterly, 2

per cent, payable Nov. 1.

The National Lead Company, regular quarterly, 1% per cent on the preferred stock, payable Dec. 15.

The Penn Seaboard Steel Corporation, regular quarterly, \$1, payable Nov. 1.

The Penn Seaboard Steel Corporation, regular quarterly, \$1, payable Nov. 1.

The Atlantic Steel Company, regular semi-annual, 3½ per cent on preferred stock, payable Nov. 1.

The Stewart-Warner Speedometer Company, regular quarterly, 1½ per cent on the common stock, payable Nov. 15.

The American Window Glass Machine Company, 12½ per cent on the preferred stock, payable Nov. 3.

The Cambria Steel Company, regular quarterly, 1½ per cent, payable Nov. 15.

The Crocker-Wheeler Company, regular quarterly, 1½ per cent on the common and 1¾ per cent on the preferred stock, payable Oct. 16.

The Dominion Bridge Company, Ltd., regular quarterly, 2 per cent and extra 3 per cent, payable Nov. 15.

The Grant Motor Car Corporation, regular quarterly, 1¾ per cent on the preferred stock, payable Nov. 1.

The Mitchell Motors Company, regular quarterly, \$1.50, payable Nov. 24.

The Mitchell Motors Company, regular quarterly, 1% per payable Nov. 24.

The Packard Motor Car Company, regular quarterly, 1% per cent on the common stock, payable Nov. 1.

The Willys-Overland Company, regular quarterly, 75c. on the common stock, payable Nov. 2.

The J. G. Brill Company, regular quarterly, 1 per cent on the preferred stock, payable Nov. 1.

Locomotive Orders

Locomotive orders in the last week were 67. The Paris Orleans Railway has ordered 50 Mikado locomotives from the American Locomotive Company. Lima Locomotive Corporation will build 10 Mallet locomotives for the Western Maryland, equipped with Jacobs-Shupert fireboxes. Inquiries were 15.

The Lincoln Steel & Forge Works, St. Louis, of which Frank S. Barks is president, has under construction a structural steel fabricating plant, which is expected to be ready for operation in about six weeks. The principal building is 90 x 200 ft., with a long crane extension. The plant will employ about 50 men at the beginning, and will increase the force as rapidly as men can be obtained and trained. A large acreage of unoccupied land adjoins the plant, enabling extension as the business requires.

Steel Ingots from Steel Foundries

Steel ingots are absorbing the attention of steel foundries in the Chester, Pa., district. Three large plants there are about to manufacture acid open-hearth ingots on a considerable scale. Every such foundry has normally more melting capacity than floor capacity to absorb it and the excess is to be taken up by ingots. In addition one foundry is building an extra furnace. probably of 25 tons; another is starting up its third 25-ton furnace and a third one is to operate to full capacity its complete open-hearth equipment. All metal not necessary for steel castings will go into ingots.

The molds used are of cast iron, 9.2 in. in diameter. and are poured large end up with a hot top. It is understood that 20 per cent is cropped by nicking and breaking, after which the ingots are individually inspected and accepted if the fracture is satisfactory. One ingot from each heat is machined before acceptance of the entire melt. Each heat will pour about 125 ingots. After acceptance the ingots are shipped to shell makers. The general practice there is to forge the pieces under hydraulic presses after which they are annealed and machined. No other heat treatment than ordinary annealing is permitted.

The specifications call for 0.45 to 0.55 per cent carbon, about 0.60 per cent manganese, 0.30 per cent as maximum for silicon, and 0.045 per cent as maximum for sulphur and phosphorus. Some foundries are hav-ing difficulty in meeting the sulphur specifications for these as well as for railroad castings, because of the abnormal sulphur content of some pig iron now being

One large foundry has recently made a considerable number of small sand-cast ingots for forging into shanks for anchors. So great is the demand for cast steel anchors of all sizes that this method has been resorted to in some cases instead of waiting for the usual cast shank.

All of the six open-hearth foundries and the one converter foundry at Chester are booked far ahead. The labor problem has been and is a serious one. There has been some slight relief recently by the discharge of over 2000 men by the Remington Arms Company at Eddystone. Many of these were formerly molders, mechanics and laborers, attracted to clean work on automatic machines at nearly double former wages.

The converter steel foundry near Chester using the Stoughton oil-burning process reports excellent results, especially as to sulphur, the steel running as low as 0.04 per cent when oil is used as a fuel.

Industrial Apprenticeship for High School Students

As the result of a conference between W. F. Roberts, vice-president Bethlehem Steel Company, and the superintendent of public schools of South Bethlehem, Pa., it has been decided to add a four-year industrial course to the regular high school curriculum. Students will study part of the day in the steel company's various departments so as to gain practical knowledge. Henceforth boys can stay in school and simultaneously serve an apprenticeship in any department of the steel works for which they have a bent, receiving wages at the same

Important copper deposits at Little Bay, about 200 miles north of St. John's, Newfoundland, are reported by the Canadian press. The lode is claimed to be 300 ft. wide with veins 1 to 2 ft. wide, containing nearly pure cupro-pyrites running as high as 29.50 per cent copper. The deposit, it is believed, promises to be one of the richest in British North America.

The Chamber of Commerce of Massillon, Ohio, which has been active in inviting industries to that city, recently carried through successfully, with less than six weeks for organization, the Massillon Industrial Exposition and Efficiency Show. It is estimated that more than 50,000 visitors came to the city in the week of this exposition.

Machinery Markets and News of the Works

CONDITIONS NEAR NORMAL

New York Shipyard Needs Equipment

Requirements Total \$2,000,000—Markets Are
Brisk Despite General Absence of Large
Lists—Labor Conditions Improve

The Standard Shipbuilding Company, Shooters Island, New York, which was lately acquired by interests headed by Jose Marimon, president Bank Espanol of Havana, announces that it will require equipment valued in the neighborhood of \$2,000,000, the purchase of some of which has already been arranged.

Throughout the entire country the machine-tool trade appears to be on a more nearly normal basis than at any time since the war started, although this, of course, does not apply to prices. Sales of one or two tools, or small groups, and enough of them to make trade brisk, are characteristic of all the markets. For the most part deliveries are slowly becoming better.

On the Atlantic seaboard shop managers are inclined to ask in some cases why they should buy additional tools when they cannot find skilled mechanics to operate them.

In Chicago the trade welcomes the more normal basis of sales which now prevails. Railroads are doing a little spotty buying in that city and in some others.

In Cincinnati the belief is held that the railroads will eventually take up the slack when war buying and that tributary to it subside. The jobbing machine shops of Cincinnati are busy.

In Detroit an improvement in labor conditions is noticed, and while there are no large orders for machinery, there are enough small ones to make the market brisk.

The demand in Milwaukee continues insistent. A good indication in that city is an increase in the volume of building.

In San Francisco buying is general, but large orders are few. The lumber interests in the Pacific Northwest are hard hit by the shortage of freight cars, but the shipbuilding industry continues to thrive, it being estimated that steel and wooden ships valued at \$30,000,000 are under construction.

New York

New York, Oct. 25, 1916.

Deliveries are slowly catching up, but they are still far enough behind to cause orders to be lost because prospective buyers do not want to wait the required time, even for tools of favored makes.

Salesmen find the great dearth of mechanics to be a detriment to their business, in that shop managers ask why they should buy tools when they cannot get men to operate them. Meanwhile there is an excellent volume of inquiries coming from scattered sources for one or a few tools. Here and there the railroads are buying a machine or two, but they cannot be called active.

Several manufacturers outside of the machine tool line are still turning out machines, and it yet remains to be seen what will be the ultimate effect of this activity. Meanwhile regular builders of tools are planning to refine and improve their machines, and in some cases to extend their line.

The Kellogg Mfg. Company, Rochester, manufacturer of

pumps, has let contract for the erection of an addition to its factory.

The Standard Shipbuilding Company, Shooters Island, New York, has been taken over by interests headed by Jose Marimon, president Bank Espanol of Havana, Cuba, with offices at 44 Whitehall Street, New York. Mr. Marimon has been made president of the shipbuilding company. At his office it is announced that the company is in the market for equipment valued at about \$2,000,000, part of which has been placed. Included is the following:

Locomotive cranes, 10
One large planing machine.
Six shaping machines.
Five drill presses.
Twelve engine lathes, also turret lathes.
Shearing and punching machines,
One 75-ton bridge crane, 60-ft. span.
One 50-ton bridge crane, 60-ft. span.
One 30-ft. plate planing machine.
One 2-head bolt cutter.
One set vertical bending rolls, 15 ft.
One set horizontal bending rolls, 14 ft.
Two slotters.
Two flat-top turret lathes.

Nine hydraulic jacks and miscellaneous tools.

Henry Wray & Sons, Inc., Rochester, N. Y., have made application for a permit to erect an addition to the plant at No. 193 Mill Street, at a cost of \$20,000. The addition will have a frontage of 50×62 ft., and 60 ft. in height. It will be built of steel and reinforced concrete and will be used as

a brass foundry and machine shop.

Pneumatic tools, 500.

The Empire Products Company, Elmira, N. Y., will erect a three-story cold storage building at Gray Street and Railroad Avenue. T. W. Cleveland is president.

The No-Glar-On Company, Watertown, N. Y., has been incorporated with a capital stock of \$100,000 to manufacture electric light bulbs. The incorporators are F. M. and A. B. Williams and C. G. Willis, Watertown,

The Gleason Works, Rochester, N. Y., has taken out a building permit issued for the erection of a one-story reinforced concrete addition to its factory on University Avenue.

The International Yachting Amusement Company, Syracuse, N. Y., has been incorporated with a capital stock of \$250,000 to manufacture amusement devices. O. J. S. Cassidy, 302 Onandaga Bank Building, Syracuse; W. E. Miller, Providence, R. I., and W. H. Kendall, Altmar, N. Y., are the incorporators.

The John H. Meyer Fire Brick Company, Newark, N. J., has had plans prepared for a three-story reinforced-concrete plant, about 140 \times 250 ft.

Albert Mertz, Newark, N. J., has had plans prepared for a commercial garage, to be erected at 582 South Twentieth Street, at a cost of about \$7,000.

W. Ames & Co., Jersey City, N. J., manufacturers of railroad spikes and bolts, will build a one-story addition on Communipaw Avenue.

The Gerleit Auto Spring Wheel Company, 723 East 135th Street, New York, has acquired property on Fourteenth Street, Jersey City, N. J., and will establish a plant for the manufacture of a patented flexible steel wheel with solid rubber tires. Vanadium steel is used for the spokes. August Gerleit is president.

The M. W. Kellogg Company, Jersey City, N. J., manufacturer of piping material, will build a new one-story generator plant on West Side Avenue.

The Gibson Mon-Auto Company, 234 First Street, Union Hill, N. J., has been incorporated with a capital of \$1,000,000 to manufacture automobiles. H. C. Gibson, A. Wyse and A. Kumpa are the incorporators.

The Simplex Automobile Company, New Brunswick, N. J., is planning the erection of a new plant for the manufacture of automobile bodies. A new factory for the manufacture of aeroplanes is also under consideration.

The Belt-Grip Company, 126 Market Street, Paterson, N. J., J. H. Auburn, agent, has been incorporated with a capital of \$50,000 to manufacture adhesive products. J. H. Auburn, I. D. Ashley and J. E. Glasser are the incorporators.

Philadelphia

PHILADELPHIA, PA., Oct. 23, 1916.

The Potter-Mackie Company and the North American Motor Company, of Pottstown, have incorporated as the North American Motors Company. Involved in the formation of the new corporation are S. Cary Potter and Norman S. Mackie, owners of the Potter-Mackie plant; George R. Bidwell, manager of the North American Motor Company, and George C. Lees, superintendent of the Potter-Mackie Company. It is reported the Potter-Mackie plant's output has heretofore been shrapnel and shells for the Italian Government. The North American Company has been making motors. The idea is to have the Potter-Mackie plant continue making war munitions as long as the demand exists. The motor manufacturing works is said to have recently received an order for 50,000 motors.

The Buckley-White Engineering Company, a Philadelphia corporation, has purchased the Cheyney property, in Chester, Pa., and will remodel it for the manufacture of a feed-water regulator. Martin L. White, Lansdowne, president of the Fuel Economy Engineering Company, Harrison Building, Philadelphia, is associated with John J. Buckley in the new company.

A plant for the manufacture of paper pulp is to be equipped at New Iberia, La., by the Sugar Cane By-products Company, Widener Building, Philadelphia, Pa.

The idle plant known as the Supplee foundry, at Fourth and Manor streets, Columbia, Pa., recently operated by the Keystone Boiler Works, now at Landisville, has been purchased by J. A. Constantine, of Columbia, who will immediately put the plant in order. It is intended to start operations at once and orders have already been placed for material. Operations will begin with a small number of men, but will be increased as needs may require. Foundry work of all descriptions will be done, and also a general line of machine work. Mr. Constantine has been associated with the Kèystone Boiler & Foundry Works, now the Monitor Works, at Landisville.

The plant of the Henry H. Jackson estate, rope manufacturer, has been conveyed by the executors, Edward H. Jackson and John B. Stevens, to a new corporation chartered at Harrisburg, known as the Thomas Jackson & Son Company, for a nominal consideration. The plant is valued at several hundred thousand dollars, and covers a narrow stretch of land four blocks long.

The Mac-It Parts Company, Lancaster, Pa., is erecting a new factory building, 60 x 178 ft., and a hardening room, 24 x 50 ft., tripling its present capacity. They expect to occupy the new building in December. Henry E. Warren is general manager.

Fire, Oct. 20, completely destroyed the phosphate manufacturing plant of the I. P. Thomas & Sons Company, Billingsport, near Paulsboro, N. J., with loss of \$100,000. The plant will be rebuilt. H. H. Lippincott, Riverton, N. J., is president.

The Jonathan Bartley Crucible Company, Oxford Street, Trenton, N. J., will build a new three-story brick addition for the manufacture of crucibles and retorts, to cost about \$40,000. Lewis Lawton & Son are the contractors.

The H. B. Smith Company, Philadelphia, manufacturer of heating apparatus, has acquired property on Seventeenth Street as a site for a new factory.

The Hess Machine Works, Philadelphia, has filed plans for a one-story machine shop, $50\ x\ 110\ ft.$, on Lancaster Avenue, to cost \$13,500.

The Ridge Avenue Iron & Metal Company, 1016 Susquehanna Avenue, Philadelphia, will build a one-story machine shop, 68 x 160 ft., on Twenty-ninth Street.

The Electric Storage Battery Company, Philadelphia, has awarded a contract to the William Steele & Sons Company, 1600 Arch Street, Philadelphia, for the erection of a new two-story factory, 90 x 130 ft., on Nineteenth Street, at a cost of \$20,000.

The Barrett Company, Philadelphia, manufacturer of roofing materials, will build a one-story brick and concrete boiler plant on Bermuda Street. The A. R. Raff Construction Company, Philadelphia, has the contract for erection.

The Belmont Packing & Rubber Company, Philadelphia, will build an addition to its plant on Butler Street.

The Enamel Mfg. Company, Philadelphia, has had plans prepared for a one-story addition, 120×200 ft., to be erected on Bartram Avenue.

The Church Lane Garage Company, Philadelphia, recently incorporated, has had plans prepared for a one and two-story commercial garage, 76 x 110 ft., to be erected at Germantown.

Baltimore

BALTIMORE, MD., Oct. 23, 1916.

The Jones & McComas Box Company, Baltimore, will build a plant for the manufacture of wooden boxes at 1816 Lancaster Street. Walter P. McComas, 901 South Caroline Street, is secretary and treasurer.

The Williamsburg Power Company, Williamsburg, Va., has been incorporated with \$50,000 capital stock. William M. Mulligan, Richmond, Va., is secretarly.

The Lynchburg Foundry Company, Lynchburg, Va., will make improvements to its plant at Anniston, Ala., which include remodeling old pits and increasing its daily capacity to 100 tons of high-pressure pipe. C. C. Moore is resident manager and W. G. Hammerstrom, chief engineer.

New England

BOSTON, MASS., Oct. 23, 1916.

There has been but little change in market or labor conditions in New England the past week.

The trouble with the bench molders at the Sessions Foundry Company, Bristol, Conn., has been settled, and the plant is running at full capacity again.

At the plant of the Rhode Island Tool Company, Providence, R. I., a notice announcing that department E would be shut down temporarily caused about 60 men to walk out as soon as the notice had been posted. The company states that the men were laid off pending a reorganization of the department, and that a certain number of the men would be taken back later. The men claim that the move was the result of the presentation of grievances some time ago, and was an attempt to forestall action on their part. The majority of the men called for their pay the afternoon of the trouble and were at once discharged.

The General Electric Company will build a steel foundry, 100 x 190 ft., and a factory building, 60 x 310 ft., at its plant in West Lynn, Mass.

The Union Twist Drill Company has awarded the contract for the erection of an addition, 68×90 ft., three stories, and 60×92 ft., two stories.

The Thomas Smith Company, manufacturer of bolts and nuts, 13 Cypress Street, Worcester, Mass., which has been operated by the estate of Frank W. Foye since his death two years ago, has been incorporated with a capital stock of \$15,000 to do a general machine shop business. E. M. Foye is president and treasurer, M. E. Foye, clerk, and J. M. Foye completes the board of directors. Frank H. Howard has been appointed general manager.

The New Haven Malleable Iron Company, New Haven, Conn., has been incorporated with capital stock of \$50,000, by Edward P. Brennan, Charles M. Brennan, both of New Haven, and William F. Brennan of Naugatuck.

The Raybestos Company, Bridgeport, Conn., maker of automobiles and accessories, has been incorporated with capital stock of \$1,500,000. The incorporators are S. Simpson, L. V. Simpson and H. G. Farwell, all of Bridgeport.

The General Mfg. Company, 66 North Elm Street, Waterbury, Conn., has ready for estimates plans for a factory, 40 x 98 ft., four stories, with wing, 25×60 ft., one story, to be erected at Maple Street and Maple Avenue.

The Billings & Spencer Company, Hartford, Conn. has secured permit for the erection of a factory, 69 x 115 ft, two stories, at the corner of Laurel and Park streets.

The Fisk Rubber Company, Chicopee Falls, Mass., has begun the erection of a boiler plant, 125 x 300 ft., which will include, besides the boiler house, a railroad trestle, coal crusher, automatic conveyors and feeders, with other auxiliary apparatus. The first installation will consist of five 760-hp. boilers. The building will provide steam and hot water for manufacturing purposes throughout the 20 buildings of the company. The entire project will represent an investment of over \$200,000.

The Bridgeport Projectile Company, Bridgeport, Connis reported to have received an order from the United States Government for material which will total about \$1,750,000 in value. It is understood the contract calls for 146 5-in naval guns and for shrapnel cases, and will take over two years to complete.

The machine shop addition to the plant of the Gibert & Barker Mfg. Company, Springfield, Mass., is well under way and work has been begun upon the addition to the tank shop. It is expected that production will begin in the new additions about the end of the year.

The Karn Terminal Company, Bridgeport, Conn. recently incorporated with a capital stock of \$200,000, will erect a coke plant, and proposes to build a water front terminal

for the storage of coal. The incorporators are R. C. Mc-Neil, Charles J. Mercer and John T. Cooper.

The Improved Paper Machinery Company, Nashua, N. H, has awarded a contract for a three-story machine shop,

The Flathers Foundry Company, 29 Crown Street, Nashua, N. H., has awarded a contract for an addition to its foundry, 20 x 100 ft., one story.

The Woburn Gear Works, Woburn, Mass., expects to move into its new concrete factory on Nov. 3. This will give the company greatly increased facilities.

Chicago

CHICAGO, ILL., Oct. 23, 1916.

Machine-tool dealers generally are welcoming the return of their business to the more normal basis of sales to the general manufacturing trade. It is the common report of the past few weeks that the bulk of business has been made up of small lots of standard purpose tools, largely for new shops erected to promote the manufacture of new devices. substantial inquiry is also noted for special power equipment, such as bulldozers, punch presses and hydraulic ma ment, skill of a scattering kind with no lists of importance except that of the Illinois Central Railroad, which it is understood has not yet been closed. For export an occasional order appears from time to time, one sale of 18 special lathes from Chicago stock was closed Dealers who have bought or contracted to buy special lathes are now beginning to evidence a ose of these lines and prices are reported to be more attractive.

The American Brake Shoe & Foundry Company, 322 South Michigan Avenue, Chicago, has been purchasing property which it is understood will be used for the enlargement of its plant at Burnside.

The Rallway Motor Car Company of America, 110 South Dearborn Street, Chicago, has purchased the plant formerly occupied by the Fitz-Hugh Luther Company, Hammond, Ind., and will use it for the manufacture of railway cars and oil fuel locomotives.

The J. P. Seeburg Piano Company, Chicago, has had plans prepared for a four-story mill-type factory, 82 x 285 ft, and a one-story power plant, the cost estimated to be 190,000. The plant will be operated by electric power.

H. C. Evans & Co., 75 West Van Buren Street, Chicago is having plans prepared for a two-story factory which will cost \$40,000 and will involve the purchase of electric power equipment, blowers, etc.

George C. Nimmons, architect, 122 South Michigan Avenue, Chicago, has completed plans for a two-story stove factory, to be erected at Kankakee, Ill., for Sears Roebuck & Co.,

The Metal Specialties Mfg. Company, now located at 730 West Monroe Street, Chicago, manufacturer of automobile acresories, has had plans prepared by Davidson & Weiss for a four-story brick factory building to cost approximately \$100,000, to be located on the northwest corner of Carroll and Ledzie avenues, Chicago.

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Robert Glenginning, Forty-ninth Street and Oakley Ave nue, Chicago, will build a one-story brick factory at 4812 South Campbell Avenue, to cost \$25,000.

The Simmons Company, Kenosha, Wis., manufacturer of beds has purchased a part of the property and plant formerly occupied by the Allis-Chalmers Mfg. Company at Twelfth Street and Washtenaw Avenue, Chicago, where it will locate a branch manufacturing plant.

The Standard Spiral Pipe Works, Chicago, is desirous of purchasing a second-hand 350-ton hydraulic press, together with pump and accumulator.

The Smurr & Kamen Machine Company, 313 North Whipple Street, Chicago, will erect an addition to its machine shop, 41 x 110 ft.

The McLernan Kitchen Cabinet Company, North Chicago, III. will erect a new factory to cost \$35,000. The company

manufactures enameled pressed steel cabinets.

The R. & R. Mfg. Company, Elgin, Ill., manufacturer of shock absorbers, has leased a new plant and expects to double its output.

The Ghent Motor Car Company, Chicago, has purchased plant at Ottrwa, Ill., which will be remodeled for its use.

Rockford, Ill., is considering the installation of an electric light plant, estimated to cost \$425,000. D. H. Maury, 53 West Jackson Boulevard, Chicago, is the engineer.

The Weaver Mfg. Company, Springfield, Ill., manufacturer of power jacks and other equipment, will build a one-story addition to its plant, 96 x 100 ft.

The Wilson Stove & Mfg. Company, Metropolis, Ill., has

been organized with a capital of \$100,000 by James B. Wilson and S. H. Long.

The American Mfg. Company, 613 Jefferson Street, Waterloo, Iowa, will build a four-story plant, 70 x 140 ft.

The Iowa Culvert Sheet Metal Company, Muscatine, Iowa, has under way the erection of an addition to its plant.

The Pressed Steel Mfg. Company, Cedar Rapids, Iowa, has been organized with a capital of \$50,000. E. C. Hampton is president.

The Grinnell Electric & Heating Company, Grinnell, Iowa, has let the contract for its new plant and work will begin at once. The building and machinery will cost about \$200,000.

The National Iron Company, Duluth, Minn., advises that it has purchased the equipment for its new plant.

The C. J. Johnson Mfg. Company, St. Paul, Minn., manufacturer of printers' supplies and machinery, is about to erect a factory to cost \$10,000.

The Megow Traction Company, St. Paul, Minn., is having plans prepared by the Foltz Engineering Company for a tractor-building plant for which an expenditure of \$100,000 is contemplated.

K. E. Alexander, purchasing agent, Minneapolis, Minneceiving tenders covering a motor-driven pump of 30, 000,000-gal. per min. capacity for the municipal waterworks.

C. L. Pillsbury, Metropolitan Life Building, Minneapolis, Minn., has prepared plans for a power plant for the city of Hibbing, Minn., the installation to cost \$200,000.

Milwaukee

MILWAUKEE, WIS., Oct. 23, 1916.

Machine-tool builders in this district again appear to be getting behind on deliveries, due to the insistent demand and the small opportunity afforded for increases of capacity, attributable for one thing to the shortage of competent help. A steady run of new orders comes in from many sources, but principally for the gradual equipment of plant extensions. Buyers appear satisfied to put in requirements one, two or three tools at a time rather than round lots, although several inquiries for large lots for proposed new works have been put out. Building operations are growing in volume after a temporary decline in September.

The last vestige of the machinists' strike for an eighthour day in the Milwaukee district has disappeared. 52½-hour working week, voluntarily instituted by the employers on July 1, is now the rule in all shops.

The Wisconsin Iron & Wire Company, 186 East Water Street, Milwaukee, expects to move into its new plant at Becher and Booth streets before Dec. 1. Work on the powerhouse was started last week.

The Pressed Steel Tank Company, Milwaukee, is making re Pressed Steel Tank Company, Miwaukee, is making preliminary plans for important extensions of its plant in West Allis. Details are still indefinite, but land at Fifty-seventh and National avenues is being graded for the work. Richard H. Hackney is general manager.

The Four Wheel Drive Auto Company, Clintonville, Wis., is advertising in the Milwaukee and Chicago papers for fifty turret and engine lathe, miller and drill-press operators, ten assemblers and two inspectors, but is meeting with considerable difficulty in filling its requirements.

The new works of the Joliet Bridge & Iron Company, Joliet, Ill., at De Pere, Wis., are now in operation. A shipment of steel was received last week and is now being fabricated, principally into railroad coaling stations, bunkers and water tanks. The De Pere plant formerly was the Lyons Boiler Works.

The Kissel Motor Car Company, Hartford, Wis., is building an auxiliary assembly shop, 40×100 ft., of concrete and brick, one story.

Huibregtse & Stokdyk, Oostburg, Wis., are building a fireproof addition, 40 x 50 ft., to their garage for machine shop purposes.

John H. Kaiser & Son. Eau Claire, Wis., have awarded contract to R. L. Rickman for erecting a wooden box and package factory, 80 x 150 ft., one-story and basement. Additional equipment is being contracted for.

Bangor, Wis., is preparing to ask for bids for the erection of a high school, with manual training department, 90 x 150 ft., to cost \$30,000. Pl Chandler & Park, Racine, Wis. Plans have been prepared by

The Superior Ice & Cold Storage Company is being or-ganized at Superior, Wis., to build an artificial ice and cold storage warehouse, 75×140 ft., four stories and basement, costing \$125,000.

The Maynard Steel Foundry Company, 716 Reed Street, Milwaukee, is preparing to enlarge its plant. The addition

will be 80×85 ft., of brick. Plans are being completed by Charles J. Keller & Son, architects, 521 Germania Building.

The Flambeau Paper Company, Park Falls, Wis., has engaged T. W. Orbison, architect and engineer, Appleton, Wis., to prepare plans for a power dam, hydroelectric plant and paper mill on the Flambeau River near by. The project involves \$125,000. Guy Waldo is secretary.

The Milwaukee-Western Malt Company, 163 South Water Street, Milwaukee, will rebuild its elevator B, of 500,000-bu. capacity, almost totally destroyed by fire Oct. 15, with a loss of \$190,000. Albert Zinn is president.

The F. J. Greene Engineering Works, Racine, Wis., has been awarded the contract for erecting a machine shop for the George Gorton Machine Company, Racine.

The Johnson & Field Mfg. Company, manufacturer of agricultural implements, Racine, Wis., whose plant was recently destroyed by fire, has leased the three-story building near by, at one time occupied by the American Seating Company. This plant is already equipped with machinery, and has suitable facilities for a continuance of the company's operations on an enlarged scale.

Cleveland

CLEVELAND, OHIO, Oct. 23, 1916.

The Vitreous Enameling Company, Cleveland, recently incorporated, has commenced the erection of a brick and steel plant, 138 x 180 ft., on Harvard Avenue. The Austin Company, Cleveland, has the contract.

The William McClellan Company, Thirty-fourth Street and Hamilton Avenue, Cleveland, also known as the Cleveland File Works, is erecting an addition to its grinding and cutting department.

The Colburn Machine Tool Company, Franklin, Pa., builder of vertical boring and turning mills and vertical drilling machines, has acquired a six-acre site on Ivanhoe Road, Cleveland, adjoining the plant of the Reliance Electric & Engineering Company, and will erect a plant next spring.

Plans for a foundry building to be erected by the Cleveland Co-operative Stove Company, Cleveland, are being prepared by George S. Ryder & Co. Contracts will be placed shortly.

The Buckeye Machine Company, Lima, Ohio, manufacturer of internal combustion engines, will shortly erect a foundry, 60 x 60 ft., of steel construction. Plans are being prepared.

The Canton Auto Parts Company, Canton, Ohio, recently incorporated with a capital stock of \$300,000, will erect a gray iron foundry, 40 x 100 ft., and a machine shop for the manufacture of piston rings. Contracts for the plant and equipment will be placed shortly. S. S. Kurtz is president.

The American Forge & Machine Company, Canton, is enlarging its capacity by the installation of new forging machinery. Several extensions were recently completed.

It is announced that a new plant will be established in Canal Dover, Ohio, by the Dover Foundry Company, to be incorporated shortly to manufacture steel ingot molds. It is planned to secure the supply of hot metal from the Dover blast furnace of M. A. Hanna & Co. in Canal Dover.

The Lewis Company, Chicago, will erect a tar by-product plant in Canal Dover to refine coal tar from the coke plant recently placed in operation by the Dover By-Products Company.

The Dover Mfg. Company, Canal Dover, is erecting a temporary plant for the manufacture of sadirons to replace the one recently burned. It is the intention of the company to erect a permanent plant later.

Detroit

DETROIT, MICH., Oct. 23, 1916.

While no large orders for machinery were placed last week, numerous small orders kept the market brisk. Deliveries are still slow on standard machines. The labor market has improved and building operations are increasing. As a result, wood-working machinery has been in increasing demand.

The General Motors Truck Company, Pontiac, Mich., announces plans for doubling its factory capacity during the year. A track system of assembling will be immediately installed.

The Manistee Iron Works, Manistee, Mich., has authorized the expenditure of \$25,000 for new machinery and equipment. The company is pouring between 10 and 12 tons of iron daily.

The Veit Mfg. Company, Grand Rapids, Mich., will move to Holland, Mich. It manufactures bank, library and office furniture. The National Tire Chain Company, Grand Rapids, Mich., will increase its capital from \$25,000 to \$100,000, C. W.

The Globe Motor Truck Company, Detroit, has been incorporated by Spencer Clark, Robert C. Yerkes and Charles A. Dolph.

The Detroit Electric Welding Company, manufacturer of electric welders and self-starters for automobiles, formerly of Detroit, has moved to Lansing, Mich., and occupies the building formerly owned by the American Cut Glass Company. Frank E. Fisher is president.

The Anderson Electric Car Company, Detroit, is building an addition to its main building, 80 x 200 ft., two stories,

Construction work on the plant of the Superior Steel Castings Company at Benton Harbor, Mich., is being rushed, and it will begin operations Dec. 1.

The Standard Foundry & Mfg. Company has moved its equipment from Alma, Mich., to the new plant erected at St. Louis, Mich.

The Automobile Crank Shaft Corporation, maker of ground crankshafts, 192 Piquette Avenue, Detroit, Mich., has been incorporated under the laws of New York for \$1,000,000 to manufacture crank shafts for automobiles, aeropianes, tractors, etc., and contemplates manufacturing nothing but crank shafts. The incorporators are J. M. Hibbard, E. E. MacCrone and W. C. Roche. It takes over all the assets and will continue the business of the Auto Crank Shaft Company. J. M. Hibbard, who has been secretary, treasurer and general manager since the business was incorporated in 1906, will continue in the same capacity, and there will be no changes in any of the other officials. Contracts have already been let for additional buildings and equipment that will double its capacity, all of which will be completed and in operation by Feb. 1, 1917.

The correct address of the Monroe Binder Board Company is Monroe, Mich., not Detroit, as stated in the IRON AGE of Oct. 12.

The Kalamazoo Malleable Iron Company, Kalamazoo, Mich., has had plans prepared by D. J. Albertson for a foundry, 250 x 300 ft., estimated to cost \$125,000.

Indianapolis

INDIANAPOLIS, IND., Oct. 23, 1916.

The Letz Mfg. Company, Crown Point, Ind., manufacturer of feed grinders, is building a two-story addition to cost \$15,000.

The Gary Foundry & Machine Company, Gary, Ind., whose plant was placed in operation this year, is about to increase its plant capacity with an addition, 60 x 300 ft.

The American Metal Furniture Company, successor to the Clark & Roberts Company, Indianapolis, Ind., manufacturer of aseptic steel furniture, advises that the acquisition of the plant and equipment of the latter company, while it provides for an enlargement of the company's business, will not for the time being involve the purchase of additional equipment.

The Hoosier Iron Works Company, Kokomo, Ind., has been organized by J. W. Johnson, C. T. Byrne, George Kingston, J. P. Grace and A. G. Seiberling. It has a capital of \$200,000, and will immediately construct a foundry building pattern shop and office building.

The Atkins Mfg. Company, Indianapolis, has been incorporated with \$50,000 capital stock to manufacture heating equipment. The directors are D. W. Atkins, A. O. Atkins and Leslie Genung.

The Coulter Shoe Brace Company, Indianapolis, has been incorporated with \$50,000 capital stock to manufacture shoe braces. Boone D. Coulter, J. D. Ellison and N. R. Coulter are the directors.

The United States Corrugated Fiber Box Company, Indianapolis, has increased its capital stock from \$40,000 to \$50,000.

The Chamber of Commerce, Indianapolis, has completed negotiations with Barnett's, Inc., for the removal of its plant from Seattle. Wash., to Indianapolis. It manufactures a full line of cutlery with interchangeable blades. Machinery is on the way from Seattle to a temporary plant in Indianapolis, pending the selection of a permanent factory site. The company has \$200,000 capital. Harley Jackson is president, A. R. Barnett, secretary and treasurer, and Charles Maynard superintendent.

The Bell Mfg. Company, Fairmount, Ind., has been incorporated with \$50,000 capital stock to manufacture metal and wood-working machinery. The directors are Henry Abrams, William J. Henley, Jr., and Jackiel W. Joseph.

The Cannelton Clay Products Company, Cannelton, Ind., has been incorporated with \$50,000 capital stock to manu-

facture fire and face brick, building tile, etc. Two '30-ft. kilns are to be erected. Leo J. Brenner is manager.

The R H. Humphrey Company, which has wood-working factories at Corydon and Depauw, Ind., has bought a site for a similar factory at Fairmount Park, New Albany, Ind.

The Newcastle Auto Parts Company, Newcastle, Ind., has been incorporated with \$20,000 capital stock to manufacture automobile parts. The directors are John E. Burns, P. J. Kennedy and W. M. Sample.

The Roberts Veneer Company, New Albany, Ind., has increased its capital stock from \$55,000 to \$72,000.

The Weidely Motors Company, Indianapolis, has increased its capital stock from \$250,000 to \$500,000.

Cincinnati

CINCINNATI, OHIO, Oct. 23, 1916.

A prominent local machine-tool builder is authority for the statement that he is somewhat pleased to note that the railroads are buying so few machine tools. His idea, which is held by other manufacturers, is that the railroads will aid materially in taking up the slack when the demand for machines from Europe and domestic munition makers ceases. Automobile marufacturers are still buying heavily, but no large lists are issued. Tire makers are purchasing more machine tools than ever in the history of their business.

The jobbing machine shops have all the work they can take care of, but the scarcity of material is causing considerable trouble. Mill supply houses and manufacturers' agents state that the delays are unavoidable and in many instances they are compelled to cut orders in half to make an even distribution.

In spite of high prices and the scarcity of building material a number of new factories are under construction and contemplated. It is currently reported that an industrial center is to be established at Winton Place and that several large plants will remove to that suburb. Plans are yet in an embryonic state.

The Oesterlein Machine Tool Company, Cincinnati, has decided to go ahead with its plans for constructing a new factory in the Camp Washington district.

The Fisher Special Mfg. Company, Cincinnati, maker of screw machine products, has let contract for an addition to its plant on Reading Road, estimated to cost \$12,000.

P. T. Baker & Son, Cincinnati, box manufacturers, will construct a plant at Liberty Street and McLean Avenue, 75 x 250 ft., one story, of brick and steel. Some extra woodworking equipment will be required later.

The Burton Stove & Range Company, Cincinnati, will remove its plant at Walnut Street to Seventh and Sycamore Streets. No new equipment will be needed.

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The Niles Tool Works Company, Hamilton, Ohio, has decided to go ahead with the construction of a new brick brass foundry, 75×175 ft., one story.

The McCormick Laboratories Company, Dayton, Ohio, has been incorporated with \$50,000 capital stock by F. J. McCormick, Jr., H. A. Estabrook, and others.

The Goldie Mfg. Company, Dayton, Ohio, has been incorporated with \$15,000 capital stock to manufacture novelties. E. C. Merkle is one of the incorporators.

The Concrete Steel Construction Company, Springfield, Ohio, has been awarded contract by Dr. G. A. Greenawalt for the construction of a five-story manufacturing building. It will be used by several companies whose names have not yet been given out.

The wood-working plant of the L. C. Grandall Company, Circleville, Ohlo, was almost completely destroyed by fire last week. No information has been given out as to rebuilding.

The Central South

LOUISVILLE, KY., Oct. 23, 1916.

High prices in the steel and machinery field are having a tendency to discourage orders, according to reports of local manufacturers. Inquirers are replying in considerable proportion that they will find it desirable to postpone improvements or extensions until steel is cheaper. This applies to boilers, plates, forgings and ice and refrigerating machinery. In the machinery and supplies field local dealers report a disposition on the part of industrial companies to postpone purchases until after election time. The pinch of the car, coal and labor shortage is a further deterrent to the volume of business.

The Fruin-Colnon Contracting Company and the Missouri Valley Bridge & Iron Company, both of St. Louis.. Mo.,

have been awarded the contract for construction of the additional pumping station for the Louisville Water Company, Louisville, Ky., for \$353,000. A pump of 30,000,000 gal. per day capacity will be installed.

The Danville Motor Company, Danville, Ky., has been incorporated with capital stock of \$5000, by T. F. Durham, D. W. Mahan and J. W. Mitchell.

J. H. Black & Co., Barbourville, Ky., is in the market for machinery for manufacturing slack-barrel headings.

Work has begun on construction of the plant of R. H. Reynolds & Co., New Albany, Ind., in which will be consolidated two woodworking plants which the company has been operating at Corydon and DePauw, Ind. The company will manufacture woodstock for automobiles.

The Mulloy Scale Company, New Albany, Ind., which will manufacture an automatic weighing machine, has increased its capital from \$2000 to \$27,000. Bernard F. Mulloy is president.

The Volunteer Stave Company, Kingston Springs, Tenn., has been incorporated with \$2500 capital stock, by William and J. E. Nesbit, Isaac T. Robertson and others and will establish a mill.

A hydroelectric power plant and pumping station is proposed by the Bearden Welfare Association, Bearden, Tenn. It is estimated to cost \$5000. Dr. M. H. Lee is president.

The Smith County Electric Company, Carthage, Tenn., will construct a power plant at a cost of \$20,000, to include a transmission system to cost \$5000. The plant is to develop 200 hp. T. B. Read is secretary-treasurer; R. S. Seese is engineer.

C. D. Wailes, Memphis, Tenn., will erect a garage at 883 Poplar Street at an estimated cost of \$3000.

The Kelsey Wheel Company, North Memphis, Tenn., and Detroit, Mich., will consolidate its factories, bringing the Detroit plant to Tennessee. This will increase the capacity of the Memphis plant, which is now producing 2000 complete automobile wheels daily.

The Shelby County Industrial & Training School, near Ellendale, Tenn., will construct an electric light plant. The county court. at Clarksville, Tenn., has appropriated \$1500.

St. Louis

St. Louis, Mo., Oct. 23, 1916.

The machine-tool business continues active with a slight improvement in deliveries. Purchases are still made by shopping about rather than by putting out lists, and most of the buying seems to be on the single tool basis. New industries are being established, but some plans are being held in abeyance.

The Bytanic Metal Company, St. Louis, has increased its capital stock by \$20,000 to extend its operations.

The General Explosives Company, St. Louis, has increased its capital stock from \$50,000 to \$100,000 and will build a larger plant than first intended.

The Hoffman Heating Company, St. Louis, has been incorporated with a capital stock of \$12,000 by John G. Ross, Fred Schmidt and Fred E. Harris to manufacture heating apparatus.

The Continental Auto Top Mfg. Company, St. Louis, has doubled its capital stock and will extend its manufacturing plant.

The Marshfield Electric Company, Marshfield, Mo., is in the market for one 50-hp. oil engine.

Slater, Mo., will install new boilers in its electric plant. L. E. Shepherd is superintendent.

The Nourse Oil Company, 1315 West Eighth Street, Kansas City, Mo., will install machinery costing \$20,000 in a factory to be built for the manufacture of oil specialties.

The Powersville Electric Light & Power Company, Powersville, Mo., has been incorporated with a capital of \$15,000 by I. O. Pollock, G. H. Scott and J. W. Rowan to equip an electric power plant.

The C. A. Spaulding Electrical Company, Kansas City, Mo., has been incorporated with a capital stock of \$12,000 by W. L. Poynter, A. H. North and M. C. Spaulding to manufacture electrical equipment.

The Fort Smith Refrigerating Company's plant, Fort Smith, Ark., has been burned with a loss of \$17,000. It will be rebuilt at once.

The Consumers' Pipe Line Company, Magnolia, Ark., will build a pipe line and establish a pumping system to supply water tanks, etc., in and about Magnolia.

The Oklahoma Refining Company, 948 Herskowitz Building, Oklahoma City, Okla., will rebuild its plant for the manufacture of lubricants and will require machinery cost-

ing \$3,000 for mixing and compounding greases. Bids will be opened Dec. 10.

Marlow, Okla., will improve its electric light and waterworks plants, erecting a power house and installing equipment to cost \$50.000.

The Sharpe-French Electric & Machine Company, Henryetta, Okla., has been incorporated with a capital stock of \$15,000 by J. H. and C. S. Sharpe and E. H. French to manufacture electrical equipment.

The Electric Oil Well Cleaning Company, Muskogee, Okla., has been incorporated with a capital stock of \$25,000 by Vin Truman, William Hough and others and will purchase machinery for cleaning oil well pipes, casings, etc.

The Oklahoma Refining Company, Oklahoma City, Okla., will build six new warehouses and 12 oil storage tanks with pumping equipment. It is also in the market for mixers, pumps, tanks, coopers' machines and supplies.

The Lula Light & Water Company, Lula, Miss., will equip an electric light plant, including a 30-hp. oil engine, a 25-kw., 2200-volt, 60-cycle generator, etc. C. S. Swann, Clarksdale, Miss., is purchasing agent.

Sumrall, Miss., will equip a waterworks plant, the machinery to cost \$20,000. X. A. Kramer, Magnolia, Miss., is engineer in charge.

J. D. Kennedy, Columbus, Miss., is reported in the market for a centrifugal pump with 4-in. suction and 4-in. discharge.

Welsh, La., will install additional engines and generating equipment in its electric plant at a cost of \$15,000.

The Great Southern Lumber Company, Bogalusa, La., W. H. Sullivan, general manager, will construct a 60-ton pulp mill and a 100-ton container liner plant, manufacturing the product from the company's saw mill waste. The machinery will cost \$600,000.

Lafayette, La., has appropriated \$20,000 for an oil engine and generating apparatus at its waterworks plant.

The Lincoln Steel & Forge Works is erecting a plant at St. Louis, the principal building of which is nearly completed, and is expected to be opened in about five weeks. The works will turn out structural steel for buildings.

The Universal Seat Company, New Orleans, La., will equip a factory for making a seating specialty. Robert T. Small is manager.

Birmingham

BIRMINGHAM, ALA., Oct. 23, 1916.

Hydroelectric apparatus remains the most active trading element in wholesale machinery, the changes from steam to electricity in manufacturing plants taking place steadily and rapidly. The car shortage, which has delayed coal shipments and raised the price, is held responsible for some of the movement, in addition to which are attractive offers by the power companies. Machine tools are very active, but hard to get. General business continues strong.

W. G. Mitchell, of the W. G. Mitchell Lumber Company, Shortleaf, Ala., has obtained control of the properties of the Alabama Portland Cement & Lime Company at Demopolis, and proposes to organize a new company to operate it.

M. E. Henry, Tifton, Ga., and associates are organizing a company with a capital of \$150.000 to build a meat-packing plant.

The Dowling-Shands Lumber Company, Green Cove Springs, Fla., will rebuild its mill recently burned at a loss of \$150,000.

The Clement Veneer & Lumber Company, Pamlico, S. C., capitalized at \$50,000, will build a plant to manufacture veneer.

Texas

AUSTIN, TEX., Oct. 21, 1916.

Trade conditions continue exceptionally good. Money from the sale of the cotton crop is rapidly finding its way into industrial circles, and many improvements which require the use of machinery and tools are in progress and under consideration.

Frank Hall, San Saba, and associates will install a new engine and make other improvements to their electric light plant.

H. A. Coleman, 819 Bourban Street, Dallas, will rebuild his planing mill which was recently destroyed by fire.

The Washington Iron Works, Sherman, has been incorporated with a capital stock of \$30,000, by Solon, Harry L. and Jess M. Totten.

The Mission Light & Water Company, Mission, has increased its capital stock from \$20,000 to \$40,000 and will enlarge its works.

San Francisco

SAN FRANCISCO, CAL., Oct. 17, 1916.

While large orders for machine tools are rather scattering, practically all metal-working plants are buying some new equipment, and in many cases obsolete tools are being replaced with modern high-speed machinery. Boilers, engines, motors and special machinery are in good demand. Implement manufacturers are still operating practically to capacity with tractors in especially good call. The mining smelting and oil industries are also fairly active buyers.

Many foundries are financially handicapped as to new purchases, owing to heavy buying of raw material before Sept. 1.

The Richmond Machine & Boiler Works has been incorporated at Martinez, Cal., by A. J. Timmons, E. Ott and Fred Reichert.

The Pacific Portable Construction Company, Los Angeles, manufacturer of knockdown houses, has acquired a site for a larger plant.

Arrangements are being made for the completion of the Old Mission Portland Cement Company's plant, San Juan, Cal., to have an annual capacity of 600,000 bbl.

A new machine shop is included in plans for the completion of the local army supply station at Fort Mason.

J. W. Turrentine of the United States Department of Agriculture is in California to arrange for the establishment of a Government plant at Long Beach or San Diego for experimental work in the manufacture of potash, etc., from kelp.

J. M. Benham, president Standard Steel Wheel Company, announces the purchase of a site near Stockton, Cal., where the company proposes to build a plant to manufacture pressed steel wheels. Galvanizing and spot-welding equipment will be installed.

J. K. Kinsman is figuring on the establishment of a general machine shop at Los Banos, Cal.

Bids are being taken for a logging engine for San Francisco's Hetch Hetchy water project.

A contract has been placed with Dyer & Co., Cleveland, Ohio, for the construction of a beet-sugar mill near Tracy, Cal.

• The Warman Steel Casting Company, Los Angeles, Cal, will erect three foundry buildings at Huntington Park at a cost of \$100,000. The plant at Redondo Beach will be moved to the new location.

The Pacific Northwest

SEATTLE, WASH., Oct. 17, 1916.

The continued car shortage in Washington and Oregon is inflicting extremely serious damage to the lumber interests. The mills engaged in railroad tie work that have not closed down are operating merely to hold the men, and at present more than 80 per cent of the lumber that usually goes direct from the mill to the car is now being piled up awaiting shipment. The car shortage is also acutely felt by farmers in the Willamette Valley along the Southern Pacific lines. The Pacific Northwest lumber exports amounted to 30,220,798 ft. for the month of September, as compared with 13,386,573 ft. for August.

The remarkable prosperity in the shipbuilding industry continues in this section, where, according to figures recently compiled, more than \$30,000,000 worth of steel and wooden ships is now under construction.

The Moore Mill & Lumber Company, Bandon. Ore., according to George W. Moore, president, plans the construction of a lumber steamer with a capacity of 900,000 ft. to replace two vessels sunk the past year.

The Kilbourne-Clarke Mfg. Company, Seattle, Wash, manufacturer of radio apparatus, announces that it has completed arrangements to increase its capital stock to \$2,000,000 and enlarge its plant to a capacity of 200 radio machines per year. C. A. Kilbourne is president.

The McCraken Motor Company, Portland, Ore, local dealer for the Moreland Truck Company, announces that an assembling plant will be constructed in Portland.

The Tacoma Lime Products & Fertilizer Company, Tacoma, Wash., has been incorporated for \$50,000 by J. B. Agner, I. Carpenter and L. Y. Staton.

The Columbia Engineering Works, Portland, Ore, plans the construction of another lumber schooner. Ways are now being constructed.

Fred A. Ballin, J. B. C. Lockwood, and the Smith & Watson Iron & Steel Works, all of Portland, are interested in a shipbuilding company in process of organization, which will construct a plant in Portland. The Smith & Watson

Company will construct the boilers, auxiliary engines and machinery for the vessels.

The Automatic Window Screen Mfg. Company, Seattle, has been incorporated for \$100,000 by J. K. Schenck and O. D. McMillan.

The Burbank Machinery Company, Seattle, has been in-corporated for \$10.000 by F. S. Burbank, L. A. Nutter and F Mack.

The Veddar River Shingle Company, Chilliwack, B. C., has recently purchased cedar holdings in West Vancouver Vancouver, has recently purchased cedar holdings in West Vancouver, B. C., amounting to 100,000,000 ft., and will construct a shingle mill with capacity of 350,000 shingles daily. Its plant in Chilliwack will be moved to West Vancouver, and six large upright shingle machines and other equipment will

The Standard Chemical Company, Tacoma, Wash., has recently acquired a site in Tacoma on which it plans to double its plant. Paul Van Horst is president.

The Galbraith-Bacon Company's Dock No. 12, Seattle, Wash, was recently destroyed by fire, with loss of about \$120,000. The machinery was a total loss. It will be rebuilt

The Morrison Mill Company, Bellingham, erect a two-story box factory, 50 x 150 ft., to replace its present structure. New motor-driven machinery will be remired. The improvements will cost \$20,000. Arch Morrison is general manager.

O. P. Graham, Portland, plans the establishment of a shipbuilding plant in or near Portland. He is at present operating a plant for the construction of motor boats.

The Oregon Short Line Railroad will expend not less than \$100,000 in the construction of its new roundhouse and shops now in progress at Nampa, Idaho.

Canada

TORONTO, Oct. 23, 1916.

The Pacific Steel Products, Ltd., Lulu Island, B. C., will erect a new steel plant to replace the one recently destroyed by fire with a loss of about \$150,000.

Beatty Bros., Ltd., are making extensive additions to their plant at Fergus, Ont. A new building is being erected parallel to the present factory on Hill Street. The com-pany will take all its metal-working machinery from its Grand River factory and install it in this building. A from its Grand River factory and install it in this building. A three-story addition is also being made to its Grand River plant, in which wood-working machinery will be installed.

Henry Schaake of the Schaake Machine Works, New Westminster, B. C., plans the erection of a foundry and machine shop to cost \$50,000.

The Weir Machinery Company, Ltd., Vancouver, B. C., has been incorporated for \$25,000, to take over the business of J. B. Weir & Co.

The Dominion Abrasive Wheel Company, Mimico, has let contract for a plant, 170 x 220 ft., to cost \$65,000.

H. Guess, Bridgeburg, Ont., has commenced the erection of a garage to cost \$20,000.

The Pacific Great Eastern Railway Company, Vancouver, B.C., will build its proposed roundhouse at East Lillooet, B.C., at a cost of \$50,000, and a machine shop and roundhouse at Squamish, B. C., at a cost of \$100,000. Contracts will be let shortly. A. H. Sperry is general manager.

Plans are being prepared for a brick factory on Bever ley Street, Galt., Ont., for the Dodge Metal Hos J. Evans, 30 Water Street, is the architect. e Company It will cost

In connection with its proposed plant at Port Colborne, Ont. the International Nickel Company, 43 Exchange Place, New York, is taking tentative prices for generators and

Tenders will shortly be called for the erection of mping station for the St. John Railway at St. John at St. John. N. B. G. G. Murdock, 73 Camarthen Street, is the engineer.

Bids will be received until Nov. 15 by J. W. Pugsley, Department of Railways and Canals, Ottawa, for the erecion of a reinforced concrete elevator of 500,000 bu. capacity at St. John, N. B. Plans and specifications are available at the office of the chief engineer, Moncton, N. B., or the J. S. Metcalfe Company, Ltd., Montreal.

M. J. O'Brien, Renfrew, Ont., has commenced the develop ment of a site and the erection of a power plant at Calaogie, Ont., estimated to cost in all \$150,000.

In connection with the power development scheme Wahnapitae, Ont., for the British Nickel Corporation, Excelsior Life Building. Toronto, the construction of a concrete dam has been started. The work is under the supervision of A. J. Felio and will cost about \$1,250,000.

Anderson Brothers, Market House, London, Ont., are in the market for a 12 or 15-hp. motor.

Robert Dollar, president of the Robert Dollar Company. San Francisco, Cal., proposes to build a sawmill on Burrard Inlet, B. C.

The Tillsonburg Foundry & Machine Company, Ltd., Tillsonburg, Ont., has been incorporated with a capital stock of \$25,000 by Sydney E. Dykeman, David J. Downs, Frederick Bushnell, and others to manufacture machinery, engines. motors, tractors, etc.

The James McKay Company, a Pennsylvania corpora tion, has been granted a license to manufacture iron, steel, bolts, hooks, forgings, etc., in Ontario, with a capital stock of \$40,000 and has appointed Franklin W. Wegenast, Room 901, 67 Yonge Street, Toronto, to be its attorney.

The Pressed Metals, Ltd., Toronto, has been incorporated with a capital stock of \$60,000 by John W. Leighton, 67 Walker Avenue; Owen J. P. Crick, James H. Chewett, and

The White Company, Ltd., Toronto, has b with a capital stock of \$40,000 by Wilfrid M. Cox, 801 Do-minion Bank Building; Howard A. Harrison, William J. Beattie, and others, to manufacture automobiles, etc.

Fire gutted the office and plant of the Machine Automatic Telephone Company at Lindsay on Oct. 17. The loss will amountto \$30,000. D. E. H. Lee is local manager.

The Canadian Lamp & Stamping Company, Ltd., Ford City, Ont., has been incorporated with a capital stock of \$100,000 by George E. Edmunds, William T. Jones and Lawrence H. Bedford of Detroit, Mich., and others.

Government Purchases

WASHINGTON, D. C., Oct. 23, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 294, for six 220-volt alternating current motors for Puget Sound; schedule 312, for three pipe-threading machines for Brooklyn; schedule 316, for one steam-driven air compressor for Charleston.

Sealed proposals will be received at the Bureau of Yards and Docks, Navy Department, Washington, until 11 a. m and Docks, Navy Department, Washington, until 11 a. m., Nov. 20, for furnishing one locomotive crane at the naval coal depot, San Diego, Cal.

Bids were received by the Bureau of Supplies and Ac-counts, Navy Department, Washington, Oct. 17, for supplies

for the naval service as follows:

Schedule 169, Ordnance

Class 131, Washington-One straightening and forcing press-Bid 105, \$990.

Schedule 170, Construction and Repair

Class 141, Pensacola—One electric spot welder and one motor generator—Bid 38, \$1,100 and \$1,410; 126, units; 183, \$775, \$750, \$390, \$900 and \$975; 199, \$780.

Schedule 171, Steam Engineering

Class 151, Portsmouth—One belt driven turret lathe—Bid 135, \$2,025; 136, \$1,100; 180, \$1,630.65.

Class 152, Portsmouth—One universal turret lathe—Bid 118, \$1,045; 180, \$1,472.95; 196, \$1,145.

ass 153, Portsmouth—Two engine lathes—Bid 67, \$940: 98, \$598; 128, \$1,032; 136, \$1,100; 187, \$1,050; 196, \$1,017, \$1,090 and \$835.

Class 154, Portsmouth—One engine lathe—Bid 118, \$1,765; 135, \$2,135; 136, \$1,850; 196, \$1,675.

Portsmouth-One boring and turning mill-Bid 128, \$4,534: 196, \$3,280.

Class 156, Portsmouth—One motor driven horizontal borer, driller and miller—Bid 128, \$6,150; 136, \$7,500.
Class 157, Portsmouth—One milling machine—Bid 21, \$1,657.13; 136, \$1,450 and \$1,500.

158, Portsmouth-Automatic screw machine-Bld

127. \$2,528. Class 159, Portsmouth-One turret lathe-Bid 135, \$942;

136, \$640; 180, \$844.40; 196, \$1,085. Class 160, Portsmouth—Two bench lathes—Bid 98, \$445;

136, \$1,032; 196, \$535. Class 161, Portsmouth—One screw slotting machine—Bid 21, \$132.50.

Class 162, Portsmouth—One involute gear cutter—Bid 21, \$641.50; 111, \$1,047; 196, \$692.

Class 163, Portsmouth-One motor driven disk grinder-Class 164, Portsmouth-Two drill presses-Bid 98, \$148;

103, \$167: 128, \$365: 196, \$162. Class 165, Portsmouth-One profiling machine-Bid 108,

\$900; 118, \$900; 122, \$1,050; 185, \$975.

Schedule 208, Ordnance

Class 221, Newport—Counterbores—Bid 62, \$1,147.20.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 21, Brown & Sharpe Mfg. Company; 38, W. Irwin Cheyney; 62, Eclipse Interchangeable Counterbore Company; 67, Federal Sales & Service Company; 98, Kemp Machinery Company; 103, Leland-Gifford Company; 105, Lucas Machine Tool Company; 111, Manhattan Supply Company; 118, Manning, Maxwell & Moore, Inc.; 126, National Electrical Supply Company; 127, National Acme Mfg. Company; 128, Niles-Bement-Pond Company; 135, Pratt & Whitney Company; 136, Henry Prentiss & Co.; 180, Warner & Swasey Company; 183, Winfield Electric Welding Machine Company; 187, Ward & Co.; 196, D. Nast Machinery Company; 199, Toledo Electric Welder Company.

The following bids were opened by the commanding officer, Frankford Arsenal, Philadelphia, under proposal 121, on Oct. 13, for furnishing 205,800 3-in. steel shells, finished, machined, banded and tested:

Item 1, price-prescribed hydraulic test to be made by contractor under supervision of government inspector; 2, price-prescribed hydraulic test to be made by the government.

The Harrisburg Pipe & Pipe Bending Company, item 1, \$3.44 each; item 2, \$3.99 each. Accept not less than 100,000 at an advance of 25c. each.

The E. W. Bliss Company, item 1, \$3.73 each.

The American & British Mfg. Company, item 1, \$3.95 each; item 2, \$3.87 each, for 50,000 or more.

The Metal Products Company and the Hydraulic Pressed Steel Company, item 2, \$3.89 each.

The Bethlehem Steel Company, item 1, \$4.20 each.

The Bridgeport Projectile Company, item 2, \$4.50 each. Water testing by contractor 5c. per shell additional.

The South Brooklyn Machine Corporation, item 2, \$5.66 each.

The Consolidated Car Heating Company, item 1, \$5.40 each for 25,000, \$4.89 each for 75,000, \$4.66 each for 150,000, \$4.56 each for 205,800; item 2, \$5.34 each for 25,000, \$4.84 each for 75,000, \$4.63 each for 150,000, \$4.53 each for 205,-300

NEW TRADE PUBLICATIONS

Taps and Dies.—Greenfield Tap & Die Corporation. Greenfield, Mass. Catalog No. 37. Size, 4% x 7¼ in.; pages, 270. Relates to the entire line of this company and supersedes catalogs No. 34 of the Wells Bros. Company, No. 36 of the Wiley & Russell Mfg. Company and No. 3 of the A. J. Smart Mfg. Company. The combination of the tools of the various subsidiaries has resulted in a simplification of the line. The old trademarks "Little Giant," "Lightning," "Green River" and "Smart" are retained and in addition a new line bearing the trademark "GTD" has been added. The lines covered by the catalog include taps, dies, screw plates, reamers, gages, tap and die holders, pipe threading tools, a self-opening die, a friction tap chuck and the new "Gun" tap which was illustrated in The Iron Age, Aug. 3, 1916. The various tools are illustrated and briefly described and tables of the different sizes that can be furnished of each are presented. A glossary of terms used in connection with the cutting and measuring of screw threads and a number of tables of useful information are included.

Fans and Heaters.—B. F. Sturtevant Company, Hyde Park, Boston, Mass. Bulletin No. 228 and two catalogs. The first illustrates a line of multivane volume fans which are made with either the fan or the driving pulley overhung. Diagrams showing the various discharge arrangements that can be supplied are presented together with dimension and capacity tables. Catalog No. 230 pertains to the heating apparatus which the company is prepared to furnish for buildings of various sizes and classes. After briefly describing the various heaters and their accessories and showing methods of installation, a number of tables and other data of interest to engineers are presented. Catalog No. 240 lists a line of fans which includes small miscellaneous units for special uses, together with the larger types. Illustrations and dimension tables of the various fans are presented, and a number of views of installations are included.

Electric Furnaces.—Electric Furnace Company of America, Alliance, Ohio. Booklet. Calls attention to electric furnaces of the resistor type for heating or heat treating steel and for heating or melting copper and other non-ferrous metals. The greater part of the booklet is devoted to views of installations, including the car type furnace for annealing steel castings, automatic heat treating furnaces for steel cast-

ings and forgings, automatic carbonizing furnaces, annealing furnaces of the continuous type and bronze meiting furnace

Door Hangers.—National Mfg. Company, Sterling In Bulletin. Treats of a storm-proof garage door hanger and rail equipped with roller bearings. Views of the hanger in use and sectional drawings showing the methods of installation possible are included.

Gears and Pinions.—General Electric Company, Schoole tady, N. Y. Bulletin No. 44,419. Shows the various types of gears that can be furnished as steel forgings or casting, a composite type consisting of a forged rim shrunk on a cast steel hub and a special spring type. The various grades are briefly described and instructions for the inspection, lubrication and mounting are included. A number of dimension tables and diagrams of comparative sizes of teeth are presented.

Jacks.—Templeton, Kenly & Co., 1020 South Central Avenue, Chicago, Ill. Catalog No. 216. Contains illustration and brief descriptions of an extensive line of jacks for use in industrial plants, on railroads and in garages. A number of views of the different jacks in use are included, together with a number of testimonial letters.

Sand Cutting Machines.—Sand Mixing Machine Company, 52 Vanderbilt Avenue, New York City. Pamphit Shows by a series of views the use of a machine for cutting and piling sand on the floor of a foundry where heavy was is done and by way of contrast views in a foundry where light work is handled are included. In connection with the first series of views the time at which each was taken in indicated with a caption descriptive of the condition of the floor at that time.

Bench Grinding Machine.—Grayson Tool & Mfg. Company, Indianapolis, Ind. Circular. Points out the advantages of using a bench grinding machine, which we illustrated in The Iron Age, April 20, 1916, for finishing dispunches, blocks, gages and ordinary work. The construction of the machine is gone into at some length and the text supplemented by an engraving of the machine. Mention also made of accessories for the machine which include vise, an emery wheel dresser and a wall countershaft. He trations and brief descriptions of all three are presented.

Air Compressors and Sensitive Drilling Stand-Chicago Pneumatic Tool Company, Fisher Building, Chicago III. Bulletins Nos. 34-Z and E-44. The first gives general description and specifications for a single steam-driven a compressor having a balanced steam valve and automate flywheel governor. After a brief general description of the compressor, the construction is gone into at some length, at text being supplemented by numerous engravings of the different parts, as well as views of the complete compressor A table of sizes and capacities is included. The other bullstin, which supersedes No. E-31, is devoted to an electric sensitive drilling stand, which is built in five sizes to take the company's standard Duntley side spindle machine. A brief media is made of the drilling machine intended for use with the stand.

Conveying Machinery—Gifford-Wood Company. Its son, N. Y. Bulletin No. 24. Refers to a line of coal convering machinery. A number of views of installations of the equipment are included. A line of ice equipment is cover views, brief descriptions and condensed specification table of the various tools being presented.

Grinding Machine Pumps.—Cincinnati Lubricant Pum Company, 126 Opera Place, Cincinnati, Ohio. Pamphi Calls attention to a circulating pump for grinding machine which was illustrated in The Iron AGE, July 8, 1916. description of the pump, which is centrifugal in its action is given and exterior and sectional views supplement it text. The special features of the pump are the absence bearings in the pump proper, gears or other close-fitting part

Crude Oil Engine.—De La Vergne Machine Compass foot of East 138th Street, New York City. Bulletin No. 16 Refers to the new sizes of the company's type FH crube engine. The special features of the new sizes, which ruse from 150 to 1200 hp., are given and a number of views of 300-hp. engine are included.

Small Tools.—Pratt & Whitney Company. Harton Conn. Catalog No. 9. Size, 4½ x 7% in.; pages, 316. The catalog, which supersedes all previous editions, illustrates at describes a line of small tools, including taps, dies, mills cutters, reamers, punches, drills and miscellaneous took is divided into seven sections, one being devoted to each desort tool mentioned. In each division illustrations, brief a scriptions and tables of sizes are given for the various type of tools and an index by list numbers appears on the impage of each section. A number of tables of useful information and a complete alphabetical index are included.

